

Progress Report

December 23, 2015

Steam Enhanced Extraction at the Former Williams AFB,
ST012 Site

Mesa, AZ



1. Summary

This report covers the period of operations from Tuesday, December 15, 2015 through Monday, December 21, 2015. The following table provides a summary of the project operational status.

Table 1. Project Summary

| | Value | Unit |
|--|------------|---------------------------------------|
| Target Treatment Zone (TTZ) Soil Volume | 410,000 | cubic yards (cy) |
| Area | 199,000 | square feet (ft ²) |
| Upper Depth of Treatment | 145 | feet (ft) below ground surface (bgs) |
| Lower Depth of Treatment | 245 | ft bgs |
| Vapor Liquid Treatment Started | 09/29/14 | |
| Thermal Operations Started | 09/29/14 | |
| Last Process Data Update | 12/21/15 | |
| Last Temperature Data Update | 12/21/15 | |
| Estimated Total Days of Operation | 422 | days |
| Days of Operation | 448 | days |
| Days of Operation vs. Estimate | 106 | percent (%) |
| Estimated Total Energy Usage | 11,343,000 | kilowatt hours (kWh) |
| Total Energy Used | 4,531,333 | kWh |
| Used Electrical Energy vs. Estimate | 40 | % |
| Total Steam Injected | 280.2 | million pounds (lbs) |
| Projected Total Steam Injection | 320 | million lbs |
| Steam Injected Vs Projected | 88 | % |
| Total Mass Removed in Vapor Based on Photoionization Detector (PID) Readings | 994,850 | lbs |
| Total Mass Removed as NAPL | 1,197,145 | lbs |
| Average Daily NAPL Mass Removal Last Week | 1,525 | lbs/day |
| Total Vapor and Liquid Mass Removal (based on PID readings) | 2,191,995 | lbs |
| Average Power Usage Rate Last Week | 503 | kilowatts (kW) |
| Average Wellfield Vapor Extraction Rate Last Week | 727 | standard cubic feet per minute (scfm) |
| Average Condensate Production Rate Last Week | 2.3 | gallons per minute (gpm) |
| Average Water Extraction Rate Last Week | 130 | gpm |
| Total Water Extracted | 69,592,204 | gallons |
| Total Recovered Light Non-Aqueous Phase Liquid | 182,214 | gallons |
| Average Water Discharge Rate Last Week | 204 | gpm |
| Total Treated Water Discharge | 92,073,000 | gallons |

Operational highlights from the past week include:

- On Sunday, December 13, Boiler 2 was brought offline for repairs. It was brought back online Tuesday, December 15.
- Groundwater extraction from the Cobble Zone (CZ) and Upper Water Bearing Zone (UWBZ) was stopped December 15 – December 17, 2015 to allow for Lower Saturated Zone (LSZ) groundwater sampling.
- On Saturday, December 19, pressure built up in a blowdown water sump transfer line due to a mineral obstruction and the hose separated from the pump causing approximately 300 gallons of city water treated with boiler chemicals – non-impacted/site water to overflow to the ground triggering a containment sump alarm at T104. As much freestanding water as possible was recovered and returned to the system. The obstructed hose segment was replaced.
- On Monday, December 21, a hose clamp failed on a blowdown water sump transfer line causing the hose to separate from the pump. Approximately 300 gallons of city water treated with boiler chemicals – non-impacted/site water to overflow to the ground triggering a containment sump alarm at T104. As much freestanding water as possible was recovered and returned to the system. The sump transfer line clamp was replaced and additional clamps were added. The clamps will also be replaced with T-bolt clamps.
- The steam injection rate to the UWBZ was adjusted on Friday, December 19 and on Monday, December 21 steam injection rates were decreased in LSZ injection wells toward perimeter well W36 (i.e., steam injection wells LSZ03, LSZ18 and LSZ23).
- The average liquid extraction rate from the formation was approximately 130 gpm during this operational period.
- The average steam injection rate in the LSZ was 19,900 lbs/hr (or 39.8 gpm).
- The average steam injection rate in the UWBZ was 8,400 lbs/hr (or 16.8 gpm).
- The average steam injection rate in the CZ was 9,200 lbs/hr (or 18.4 gpm).
- The average steam injection rate as water for all zones was 75.0 gpm.
- The net extraction from the formation was 55 gpm (approximately 1.7 times the water volume injected as steam was extracted as water).
- Collected process, wellfield and laboratory samples per the sampling schedule.
- Conducted regular maintenance on the treatment system.
- The following MPE wells were identified as requiring maintenance during this operational period:
 - LSZ05*
 - LSZ06*
 - UWBZ02*
 - UWBZ26
 - CZ11
 - CZ16*

**Temperatures at these MPE wells are at boiling – well maintenance will be postponed until temperatures are below boiling due to health and safety concerns.*

2. Vapor Extraction

Figure 1 below shows the vapor extraction rate from the site. Note that the estimated steam extraction rate is a calculated value based on the water generated at the moisture separators after cooling the vapors from the wellfield. Based on energy balance analysis, additional steam is likely being pulled into and condensing in the liquid extraction system. This steam extraction is not measureable and not accounted for in Figure 1. Additionally the wellfield flow is calculated as the difference between the air stripper flows and thermal accelerator influent, and is therefore only an estimate.

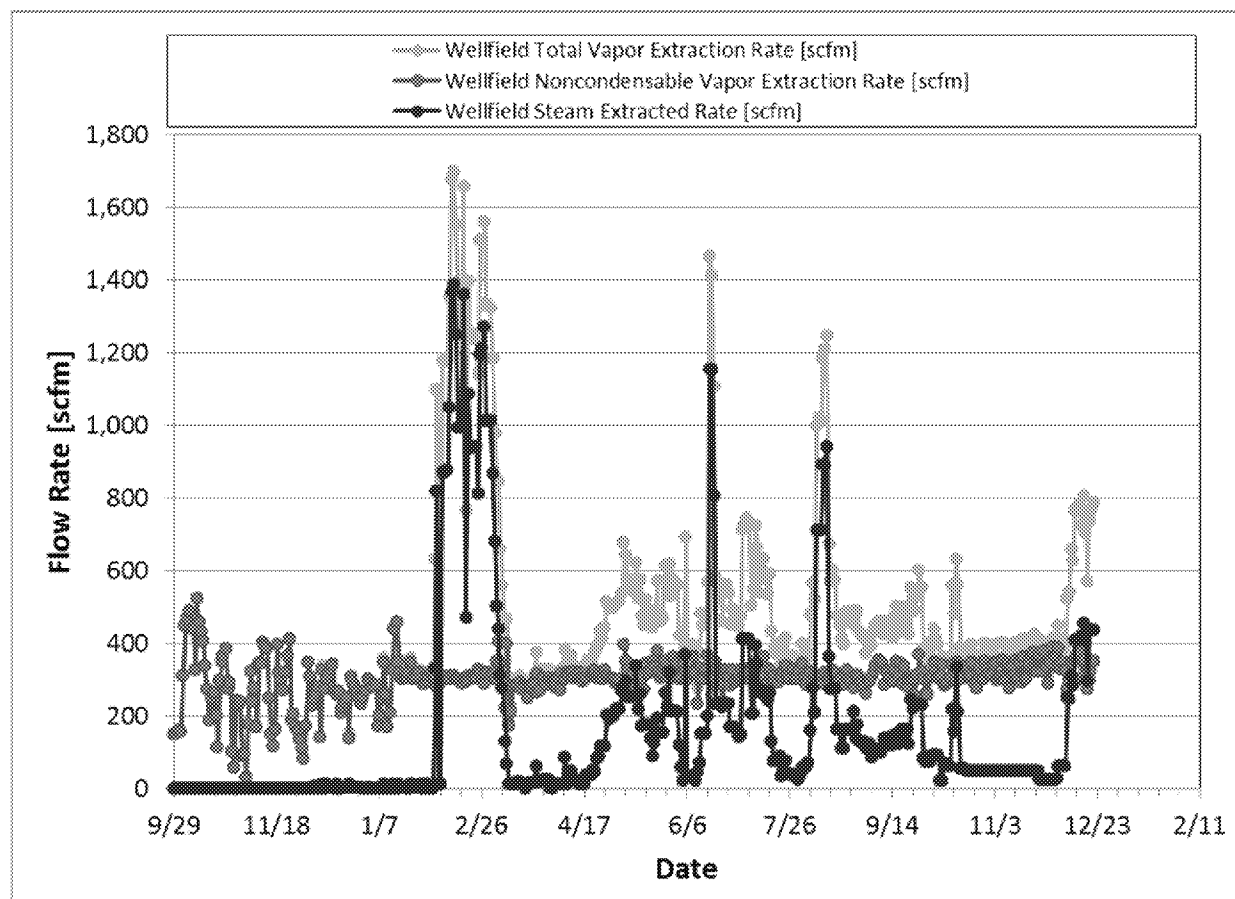


Figure 1. Vapor Extraction Rate

Note: Well SVE01M was tied into the SEE extraction system on June 5, 2015. Wells SVE10M and SVE14M were tied into the SEE extraction system on September 23, 2015.

3. PID Measurements

The following figure depicts the PID concentrations from the wellfield effluent to the effluent of the thermal accelerators collected since the start of operations. Note that PID readings of 0.0 parts per million by volume (ppmV) are shown in the figures as 0.01 ppmV due to the logarithmic scale that does not allow display of 0-values. Accelerator influent readings are interpolated for days where no data is collected, since the value is used in the mass removal calculation.

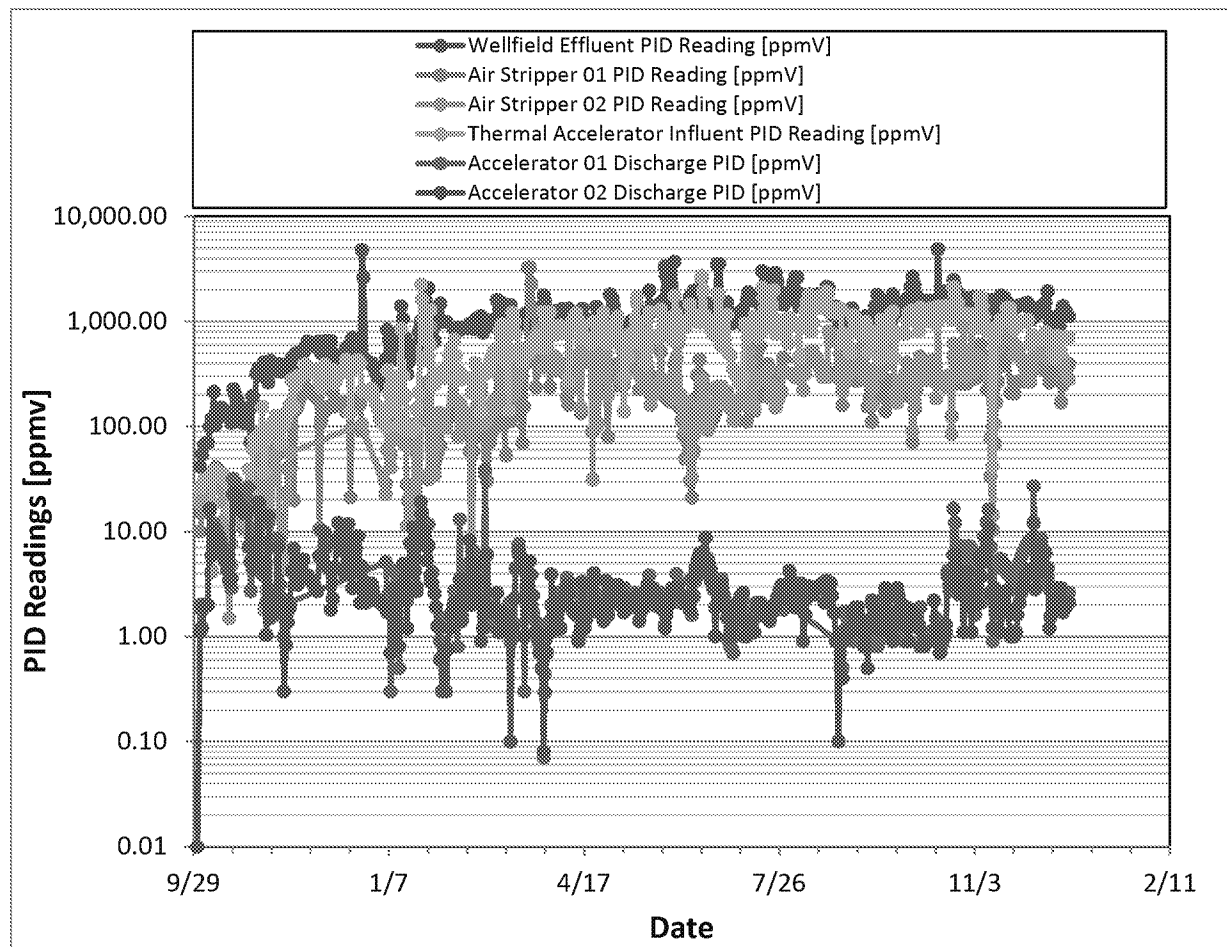


Figure 2. PID Readings

4. Mass Removal

The mass removal is calculated based on the PID and laboratory data collected at the thermal accelerator influent and the LNAPL recovered. The figure also depicts the mass removed based on PID and laboratory data.

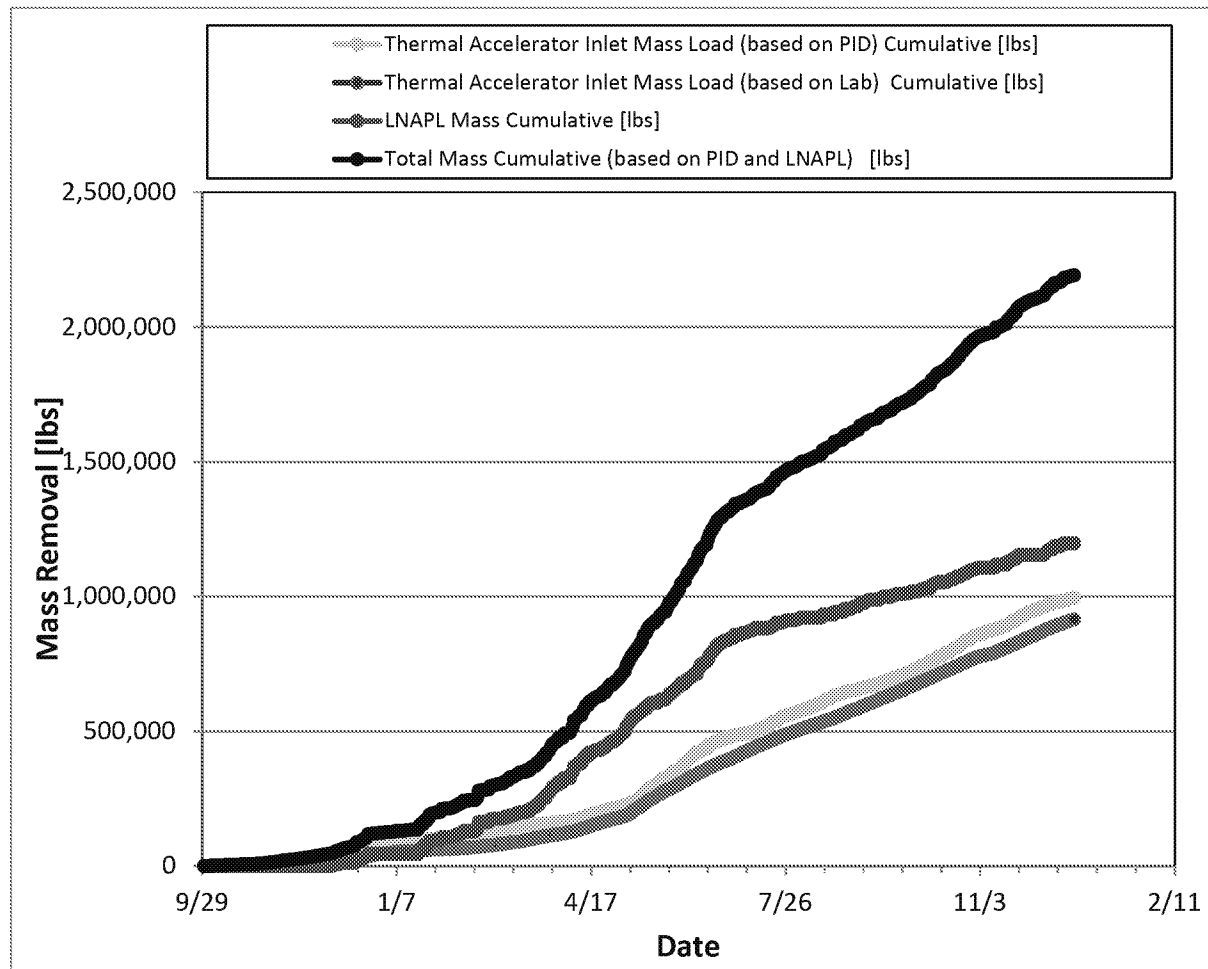


Figure 3. Mass Removal

Note: A NAPL density of 6.57 lbs/gallons is used to convert the NAPL volume to pounds. A molecular weight of 106,168 g/mol (corresponding to xylene) is used to convert PID readings to concentrations.

5. Daily Mass Removed

Figure 4 outlines the daily mass removed as vapor and LNAPL. The total daily mass removed is the combination of vapor and LNAPL. The liquid mass removal is captured in the vapor phase due to the volatilization of liquid contaminants in the air strippers.

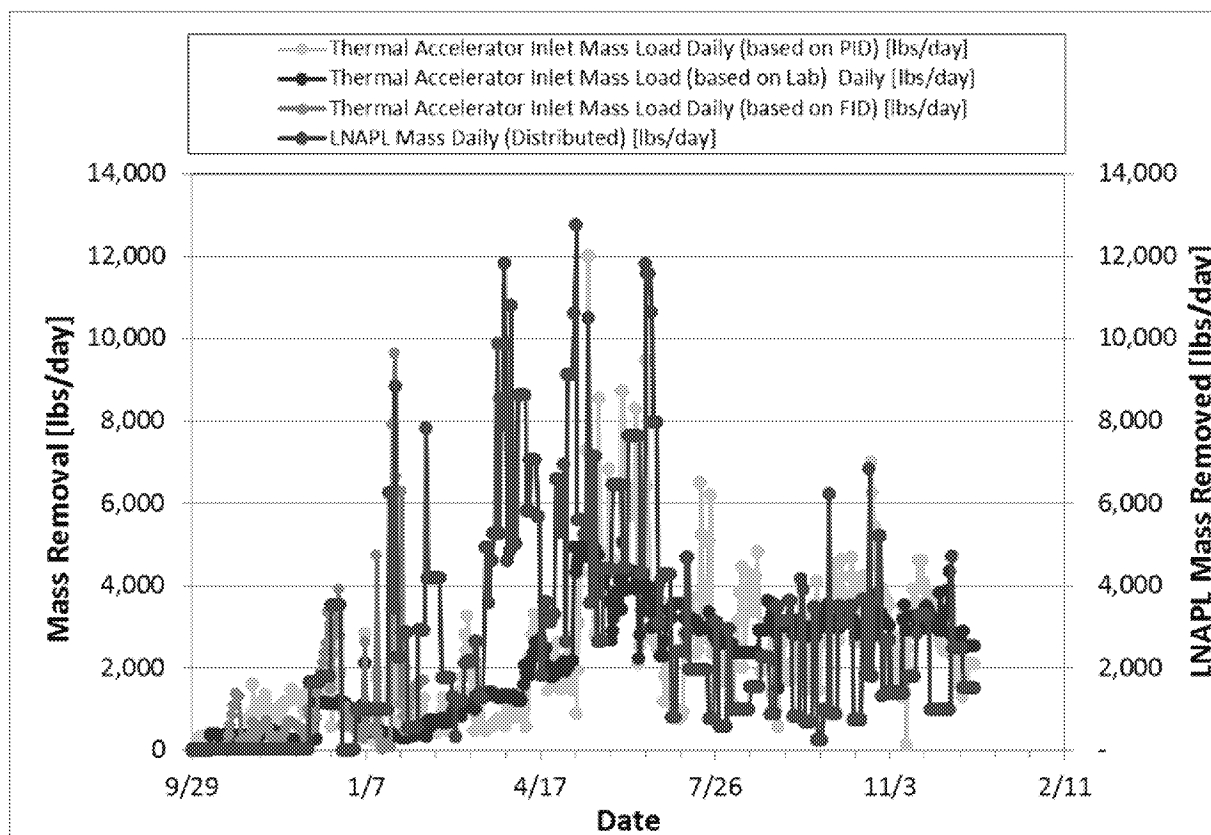


Figure 4. Daily Mass Removed

Note: Laboratory data are not collected daily. The “Thermal Accelerator Inlet Mass Load (based on lab)” is an average daily rate of actual lab data collected. The report has been updated based on lab data received for samples collected through November 10, 2015.

Note that accumulated LNAPL is pumped through the NAPL conditioning system in a batch style process. The LNAPL daily mass removal rate has been calculated by calculating an average daily rate based on the total gallons processed for each batch over the number of days between batches.

6. Power Usage

The cumulative power usage is shown below. All electricity used at the site is utilized to run the process system and steam generators.

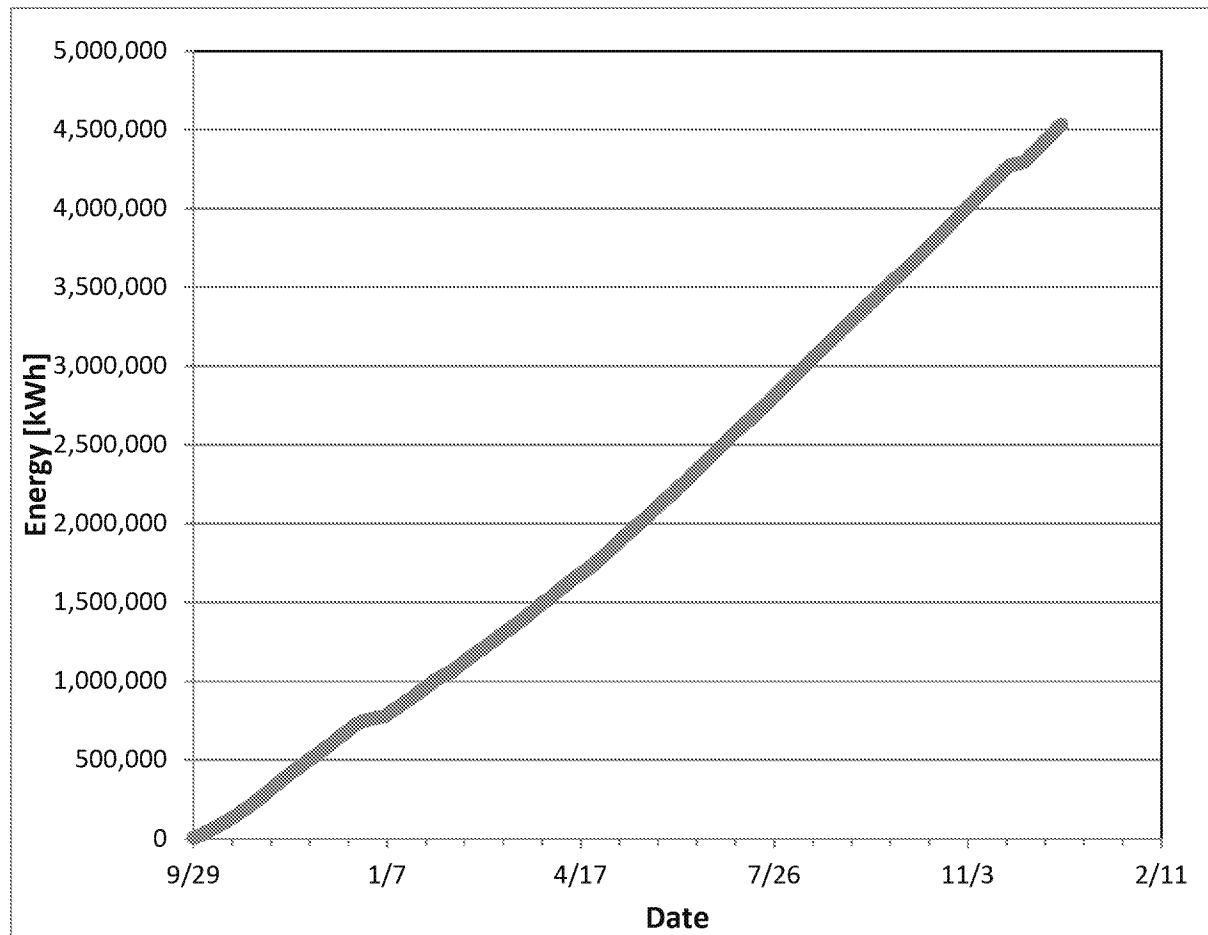


Figure 5. Cumulative Power Usage

7. Average Temperature

A detailed review of thermocouple sensor depths and temperatures over time was performed week ending November 13, 2015. Results of the review and updates are detailed below in Table 2 and Figure 6.

Table 2. Temperature Monitoring Sensor History

| Temperature Monitoring Point | Temperature Monitoring Sensor History |
|------------------------------|---|
| TMP01 | Well compromised 6/9/2015, select sensors back online 7/15/2015. Well not extended down in the Lower Permeable Zone (LPZ) and LSZ. |
| TMP03 | Well compromised 12/18/15. All sensors offline as of 12/18/15. |
| TMP04 | Well compromised 6/21/2015. Not included in LPZ and LSZ since 6/21/2015. |
| TMP05 | Well compromised 5/6/2015, select sensors back online 7/15/2015. Sensors deeper than 160 ft have not been online since 5/6/2015 and therefore are not included in UWBZ, LPZ and LSZ. |
| TMP06 | Well compromised 3/27/2015, select sensors back online 7/14/2015. On 9/10/2015 all sensors went offline and have been excluded from LPZ and LSZ averages. |
| TMP07 | Well compromised 3/27/2015, select sensors back online 7/14/2015. |
| TMP08 | Well partly compromised 9/11/2015 from 210 ft and down. The 215 and 235 ft sensors are still operating. |
| TMP09 | Well compromised 2/9/2015 before CZ was turned on and UWBZ was up to temperature. The CZ and UWBZ temperatures have been excluded. LSZ temperatures have not been updated since 2/9/2015 (taken out of LSZ average). |
| TMP12 | Sensors from 150 to 170 ft bgs only at ~50C. Brings down the average in CZ and UWBZ. |
| TMP13 | Well compromised 3/27/2015, select sensors back online 4/30/2015. Since 7/1/2015 no sensor deeper than 225 ft has been operational. |
| TMP15 | Well compromised 8/15/2015. 8/15/2015 temperatures assumed from this day. |
| TMP17 | Well compromised 3/27/2015, select sensors back online 6/12/2015 but not reporting properly, total failure 7/16/2015. Depths lower than 235 not included in average since well was not at temperature when sensors failed. 7/16/2015 temperatures applied to average since well failed. |

The average soil temperatures as degrees Celsius (°C) and degrees Fahrenheit (°F) are shown in the figure below by treatment zone (i.e., LSZ, UWBZ and CZ).

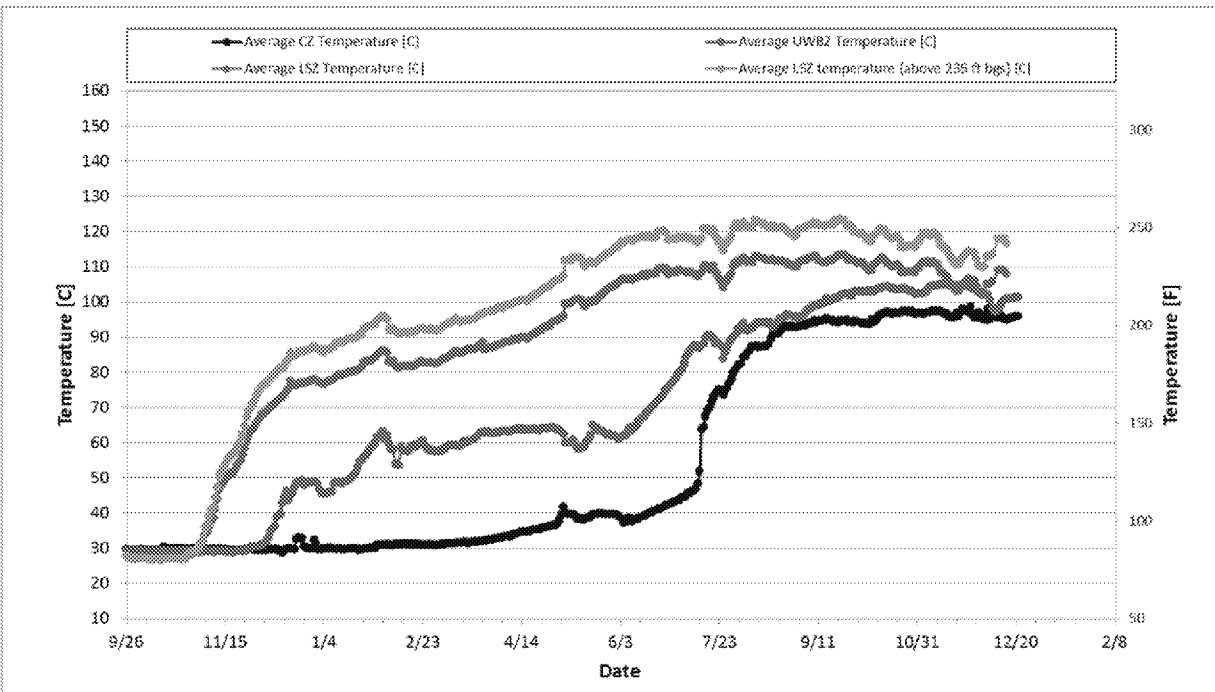


Figure 6. Average Soil Temperatures

Table 3 below provides a breakdown of the maximum average temperatures achieved at individual temperature monitoring points throughout SEE operations. The table below breaks down the average temperatures achieved across the CZ, UWBZ, Lower Permeability Zone (LPZ) and the LSZ. The LSZ is further broken down into the average for all LSZ sensors and those LSZ sensors above 235 ft bgs.

Table 3. Temperature Monitoring Point Maximum Depth-Averaged Temperature

| Temperature Monitoring Point | Temperature Monitoring Point Maximum Depth-Averaged Temperature ¹ (°C) During SEE Operations by Zone | | | | |
|---|---|--------------|--------------|--------------|-------------------------------|
| | CZ | UWBZ | LPZ | LSZ | LSZ (depths above 235 ft bgs) |
| TMP01 | 114.7 | 130.5 | N/A | N/A | N/A |
| TMP03 | N/A | N/A | 137.5 | 114.2 | 120.7 |
| TMP04 | N/A | N/A | 103.8 | 118.8 | 127.1 |
| TMP05 | 110.3 | N/A | N/A | N/A | N/A |
| TMP06 | N/A | N/A | 137.4 | 135.0 | 135.9 |
| TMP07 | N/A | N/A | 134.6 | 137.2 | 140.2 |
| TMP08 | N/A | N/A | 136.6 | 131.3 | 135.4 |
| TMP09 | N/A | N/A | 132.5 | 134.1 | 139.3 |
| TMP11 | N/A | N/A | 109.6 | 119.1 | 131.7 |
| TMP12 | 75.7 | 90.3 | 121.8 | 121.4 | 131.3 |
| TMP13 | 102.1 | 119.8 | 130.6 | 138.4 | 140.0 |
| TMP14 | N/A | N/A | 133.6 | 124.3 | 136.3 |
| TMP15 | 113.1 | 123.3 | 128.7 | 126.5 | 135.6 |
| TMP16 | N/A | N/A | 126.7 | 120.5 | 131.0 |
| TMP17 | N/A | N/A | 135.2 | 136.9 | 136.9 |
| Maximum depth-averaged by zone² | 103.2 | 116.0 | 128.3 | 127.5 | 134.0 |

If N/A, Temperature Monitoring Point has no sensors in that zone

¹ Temperature of the thermocouples across each depth zone are averaged for each TMP and each available time interval and then the maximum value of those averages throughout operations is listed in the table.

² Average of maximum depth-averages listed above for all TMPs in each zone.

8. Vertical and Horizontal Temperature Profiles

The following Figures 7 and 8 show the temperature in °C versus depth profiles for each of the 17 individual temperature monitoring points. Please see Table 2 for an updated temperature monitoring sensor status.

Temperature highlights for the past week include:

- TMP 01 has seen a slight increase in temperature in the CZ and UWBZ over the last week.
- Perimeter well TMP 02 has remained stable over the last week.
- TMP 03 has been disabled since December 18, 2015.
- TMP 08 has reached boiling in the LSZ and the bottom of the UWBZ.
- TMP 10 increased in temperature in the CZ over the last week.

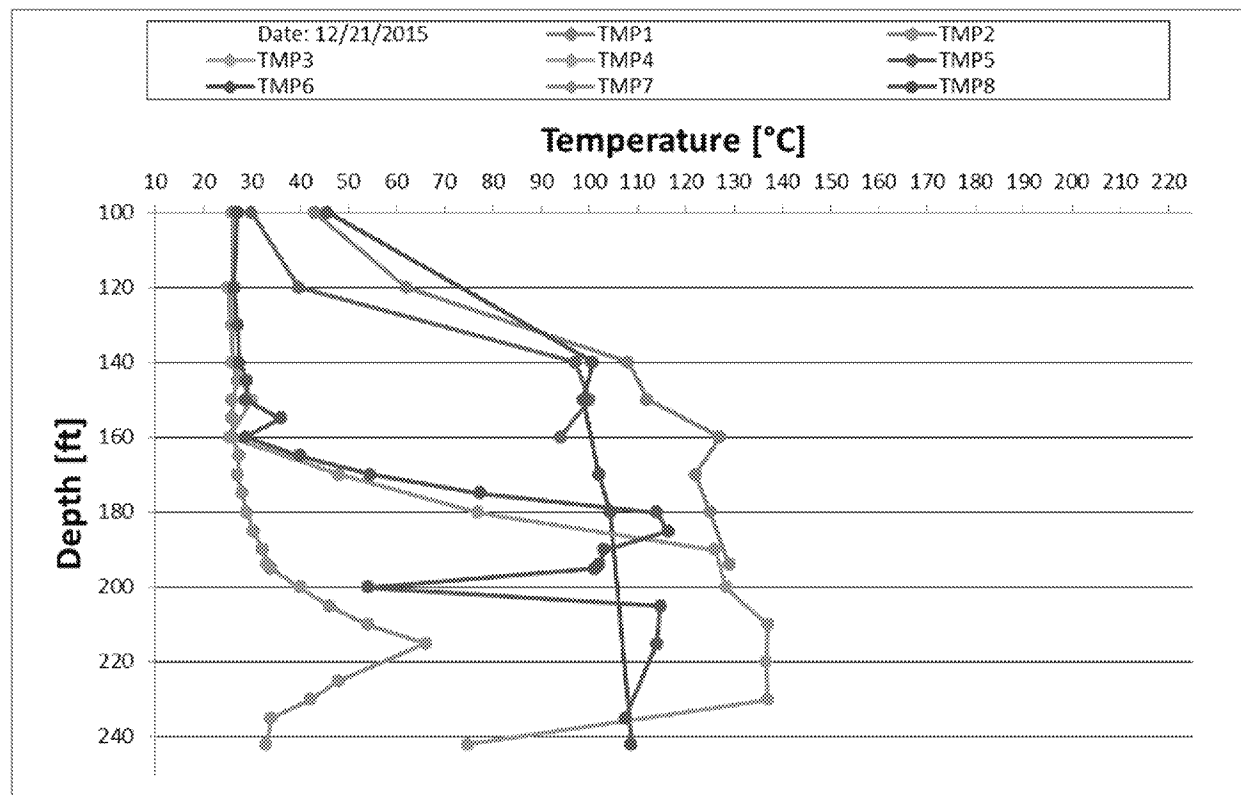


Figure 7. Vertical Temperature Profiles (TMP01 through TMP08)

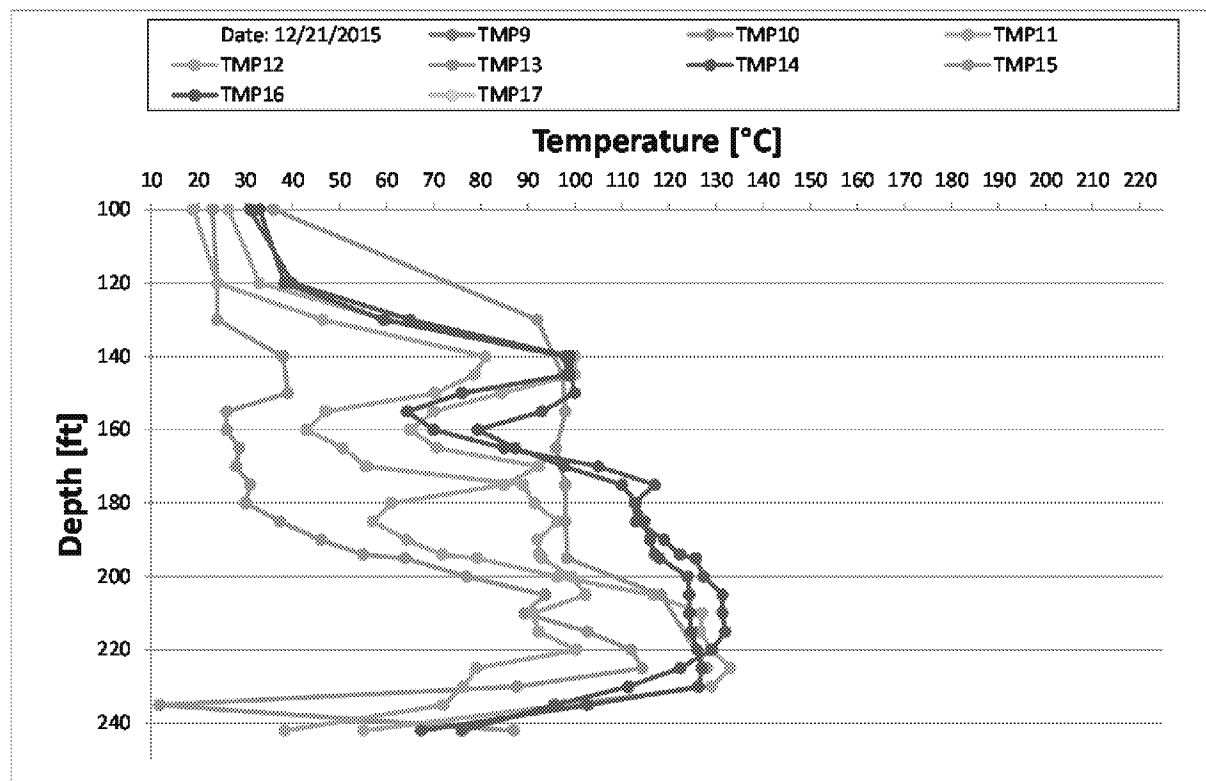


Figure 8. Vertical Temperature Profiles (TMP09 through TMP17)

Figures 9-12 show the horizontal temperature distribution across the site in four depth intervals.

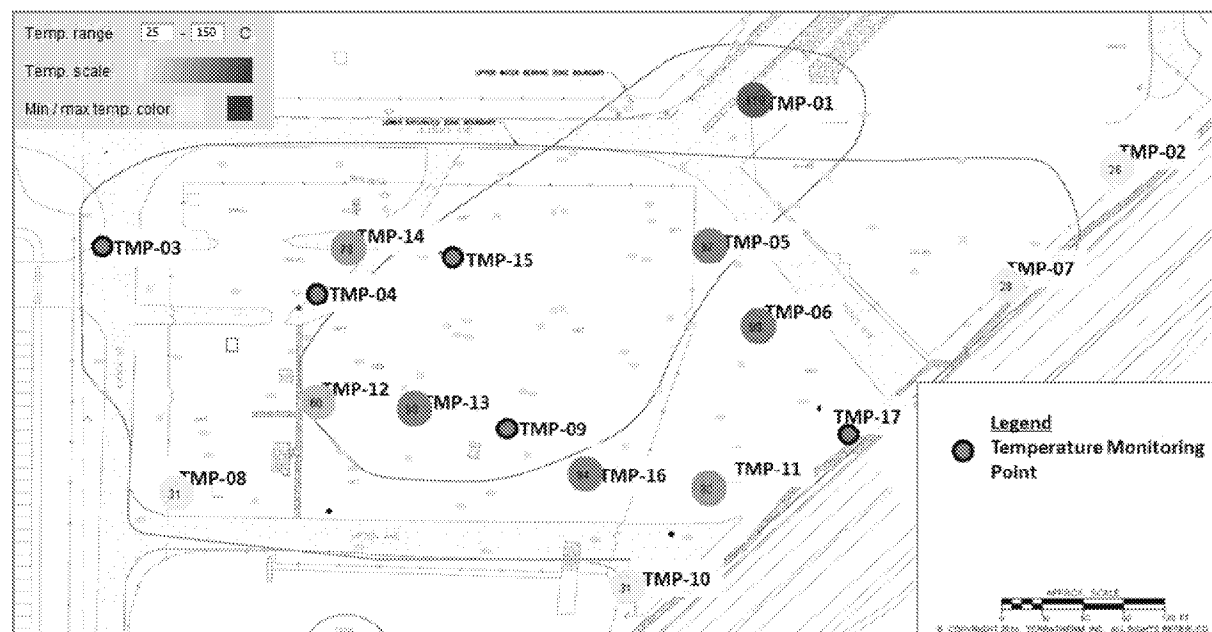


Figure 9. Horizontal Temperature Distribution across the CZ (145-160 ft bgs) (temperatures shown in °C)

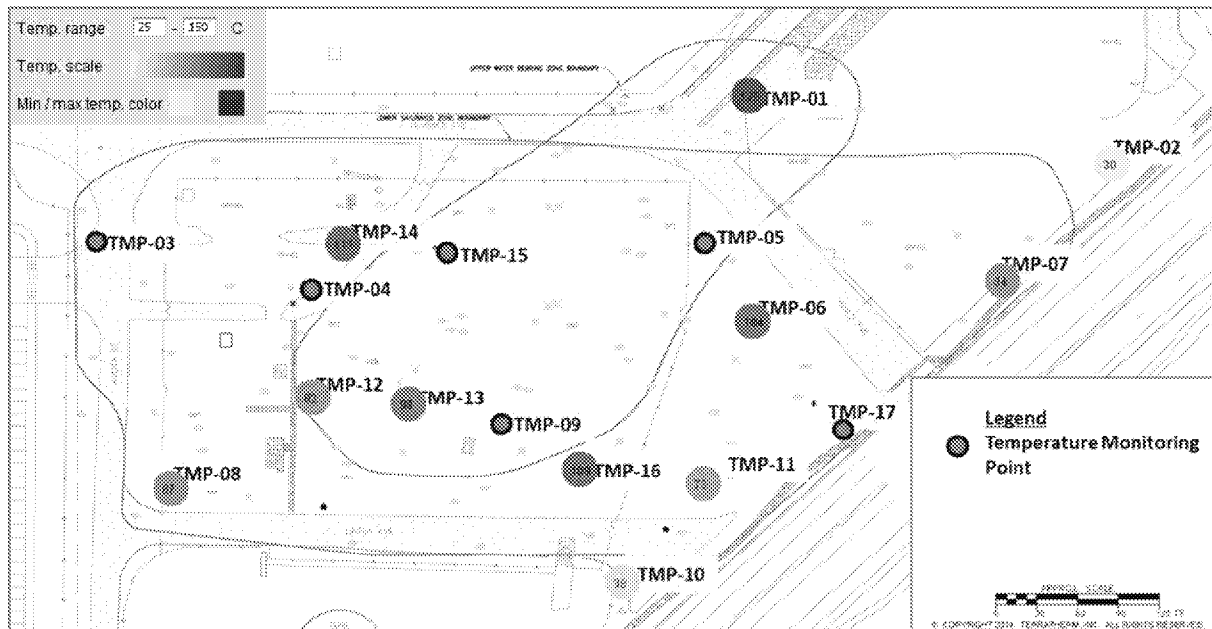


Figure 10. Horizontal Temperature Distribution across the UWBZ (161-195 ft bgs) (temperatures shown in °C)

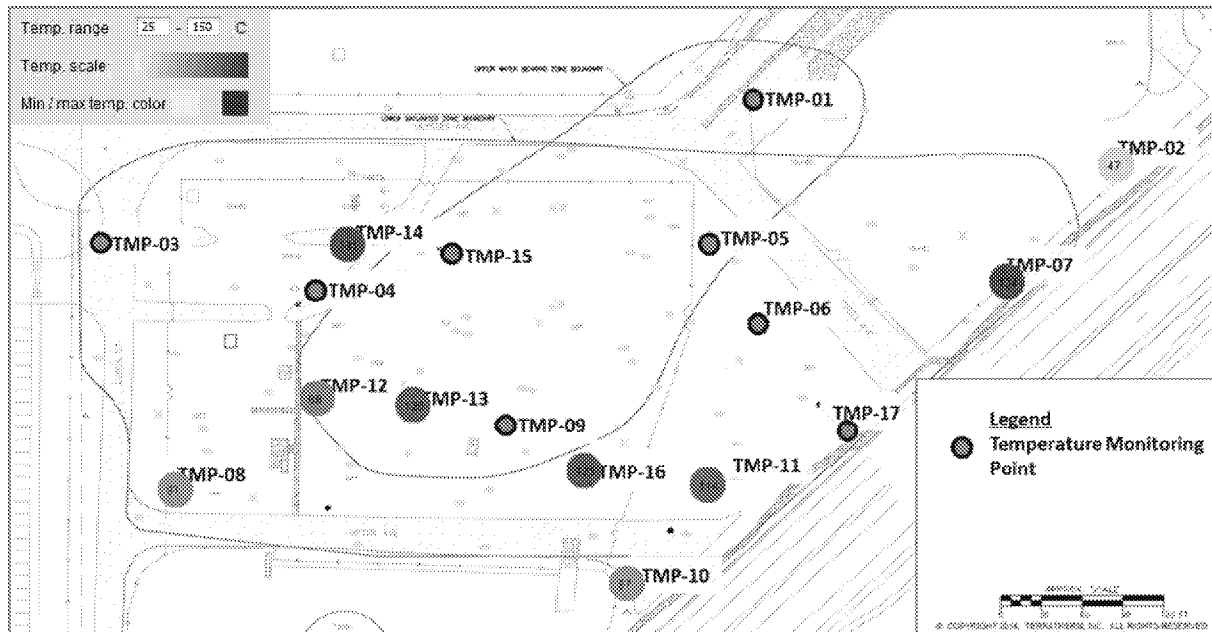
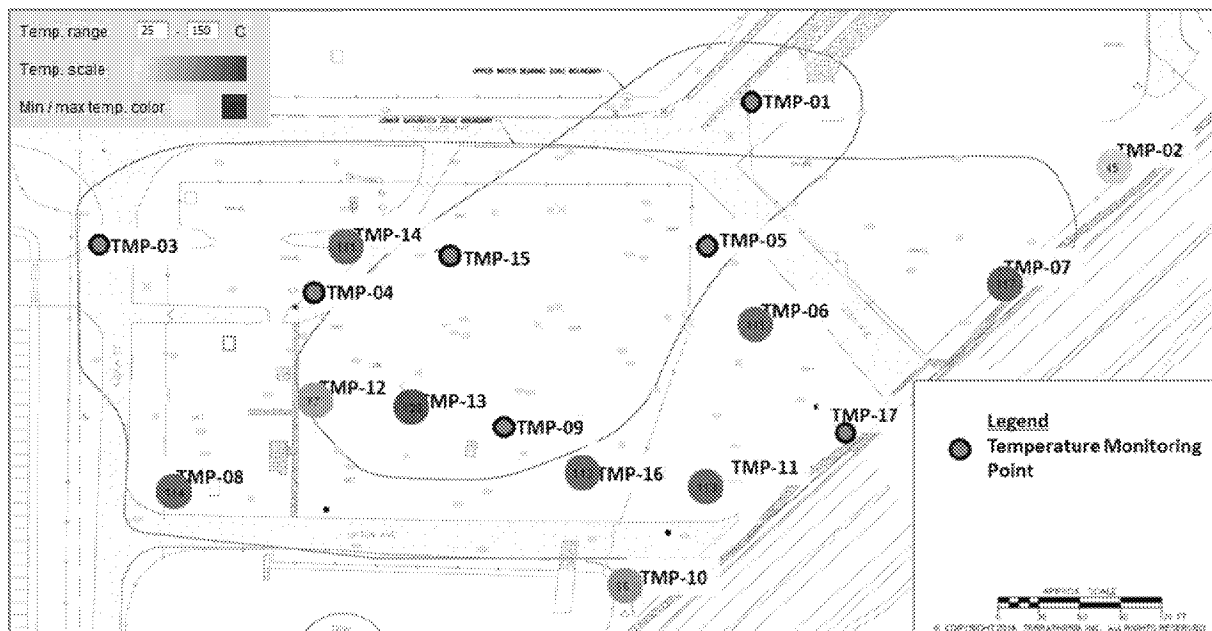


Figure 11. Horizontal Temperature Distribution across the Lower Permeable Zone (196-210 ft bgs) (temperatures shown in °C)



9. Cumulative Steam Injection

Steam injection was initiated Thursday, October 16, 2014. Figure 14 below shows the cumulative steam injection for each of the three injection zones.

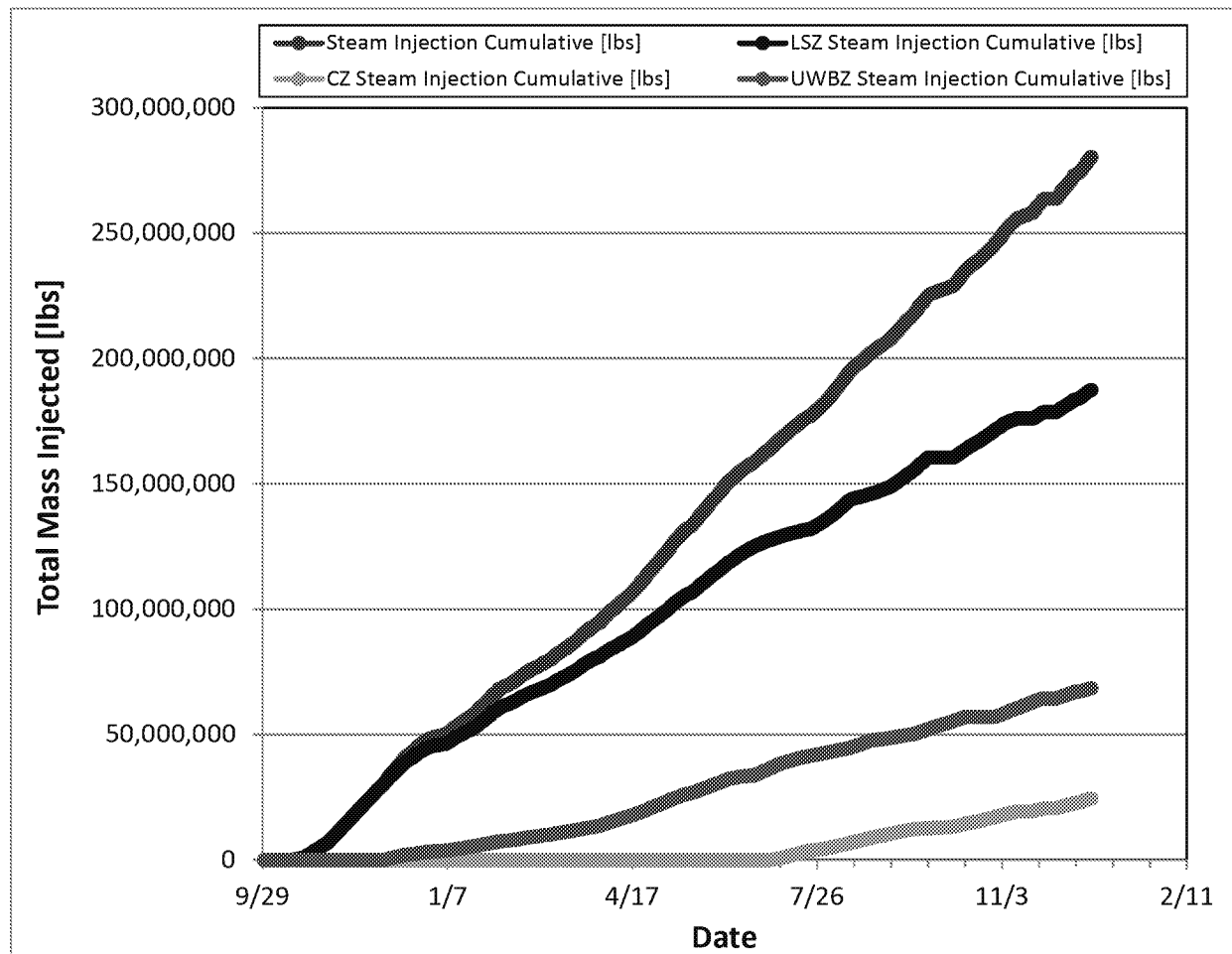


Figure 14. Cumulative Steam Injection for Each of the Three Injection Zones

10. Steam Injection Rates

The figure below shows the steam injection rates for each of the three injection zones.

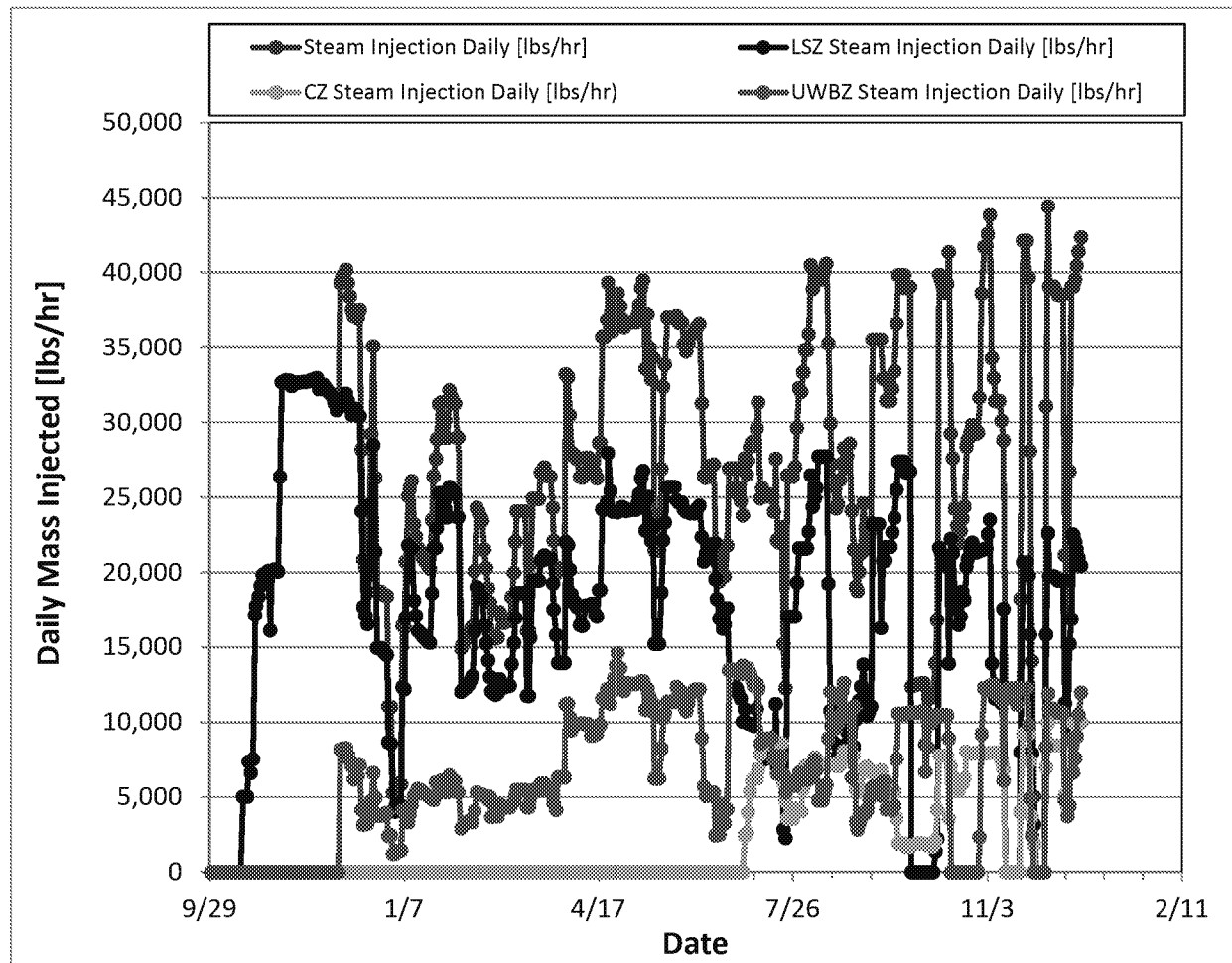


Figure 15. Steam Injection Rate for Each of the Three Injection Zones

11. Cumulative Water Extraction by Zone

The cumulative water extraction for each of the three treatment zones is shown below. The cumulative water extraction is calculated based on flow meters installed at each of the 57 extraction wells (accuracy should be considered +/- 20%). The figure below shows the net liquid extracted from the subsurface at the site and does not include the fraction of water that is recirculated to the eductor wells and used as motive water.

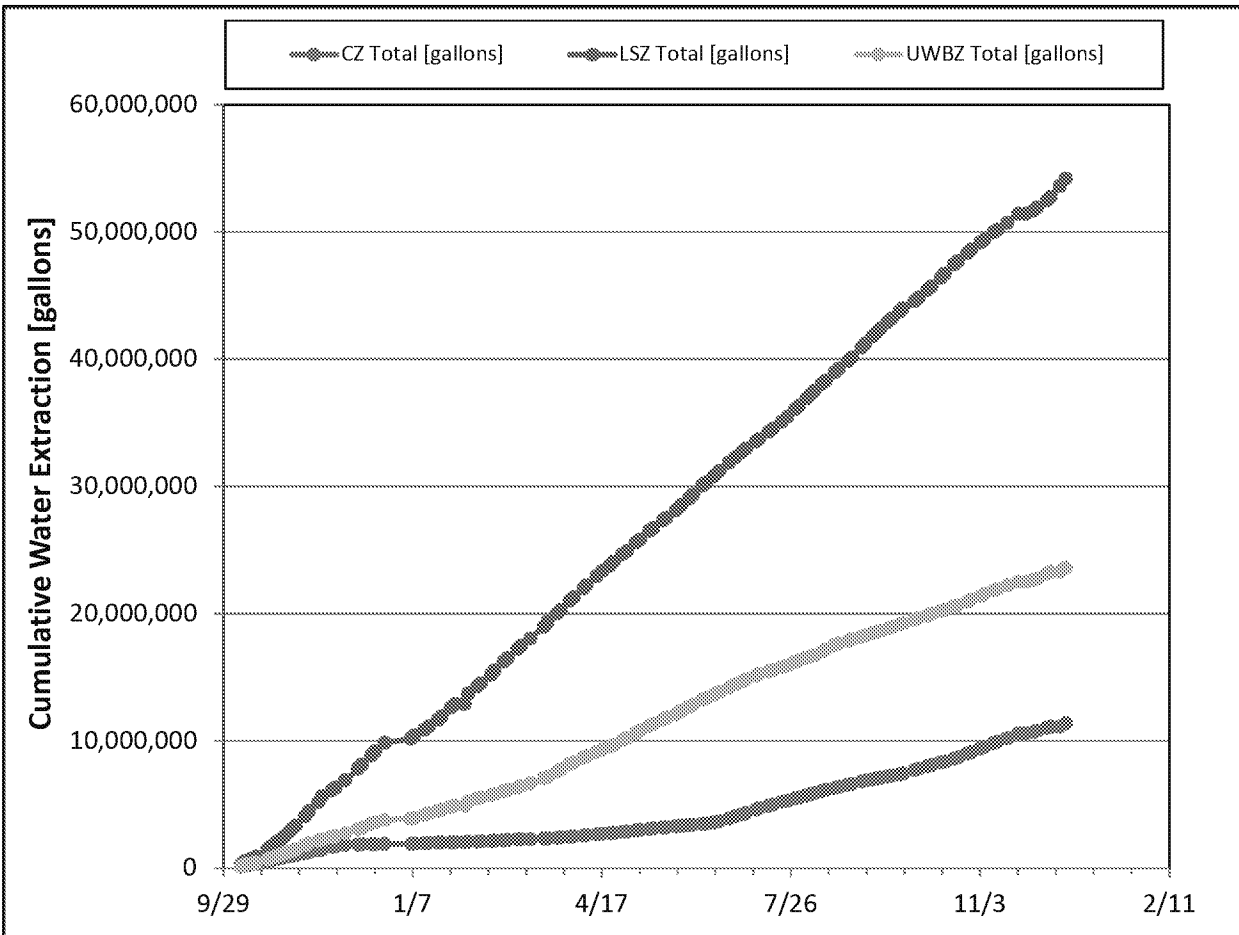


Figure 16. Cumulative Water Extraction for Each of the Three Treatment Zones

12. Water Extraction Rates by Zone

The figure below shows the water extraction rates for each of the three treatment zones.

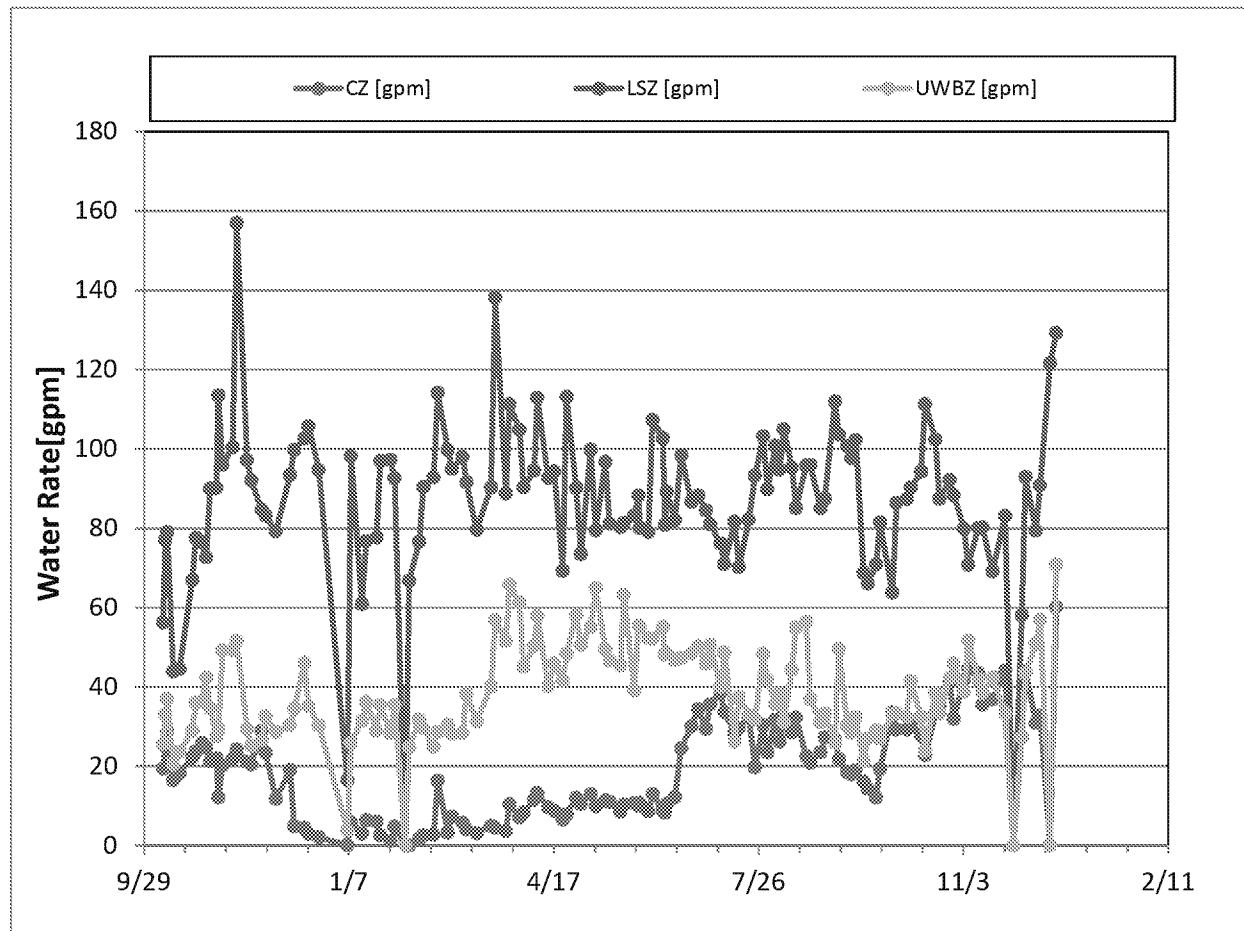


Figure 17. Water Extraction Rates for Each of the Three Treatment Zones

13. Cumulative Water Balance

The cumulative water balance for the site is shown below. The chart shows the net liquid extracted from the subsurface at the site and does not include the fraction of water that is recirculated to the eductor wells and used as motive water.

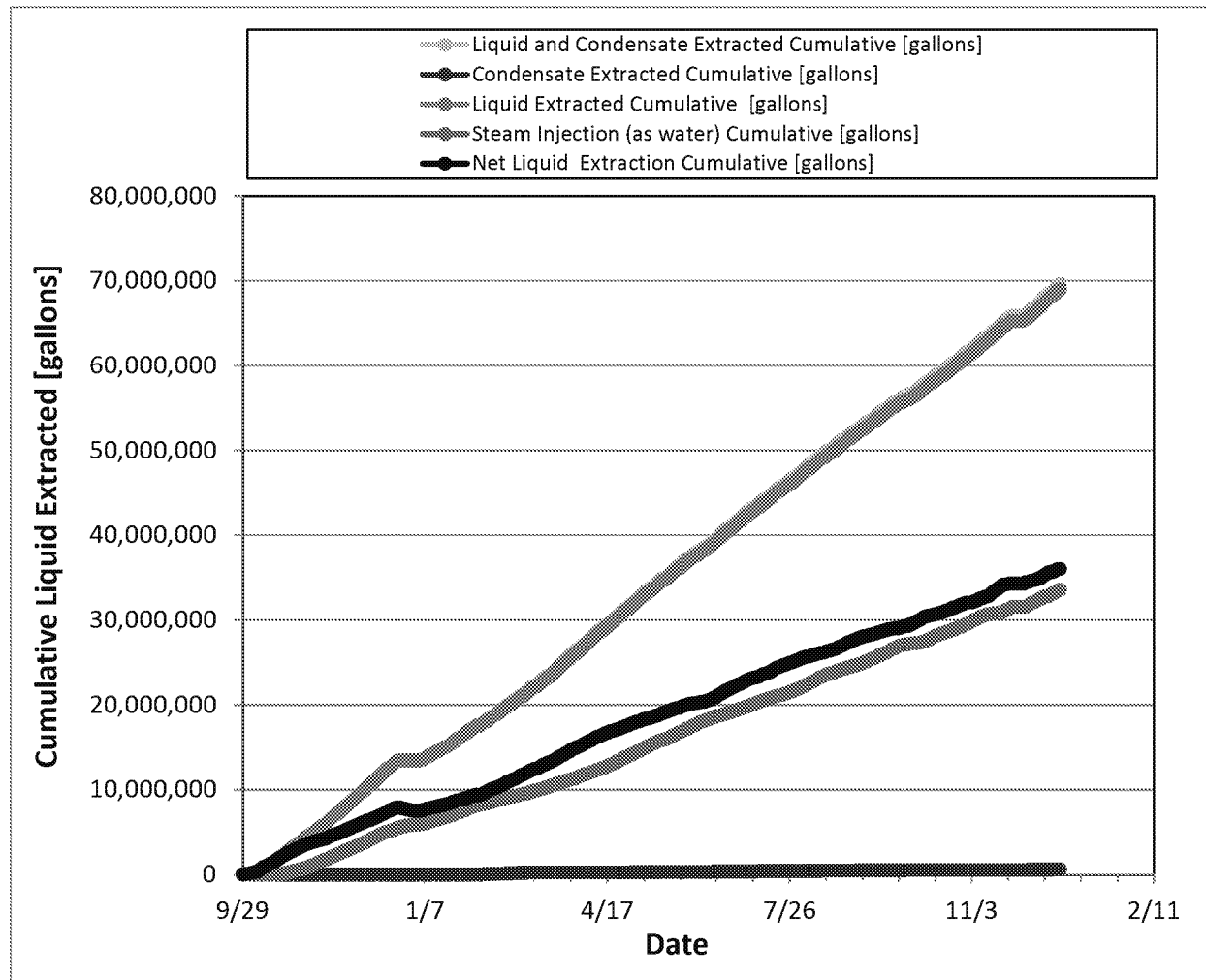


Figure 18. Cumulative Water Balance

14. Water Balance Rate

The total system water extraction rates are shown in the figure below.

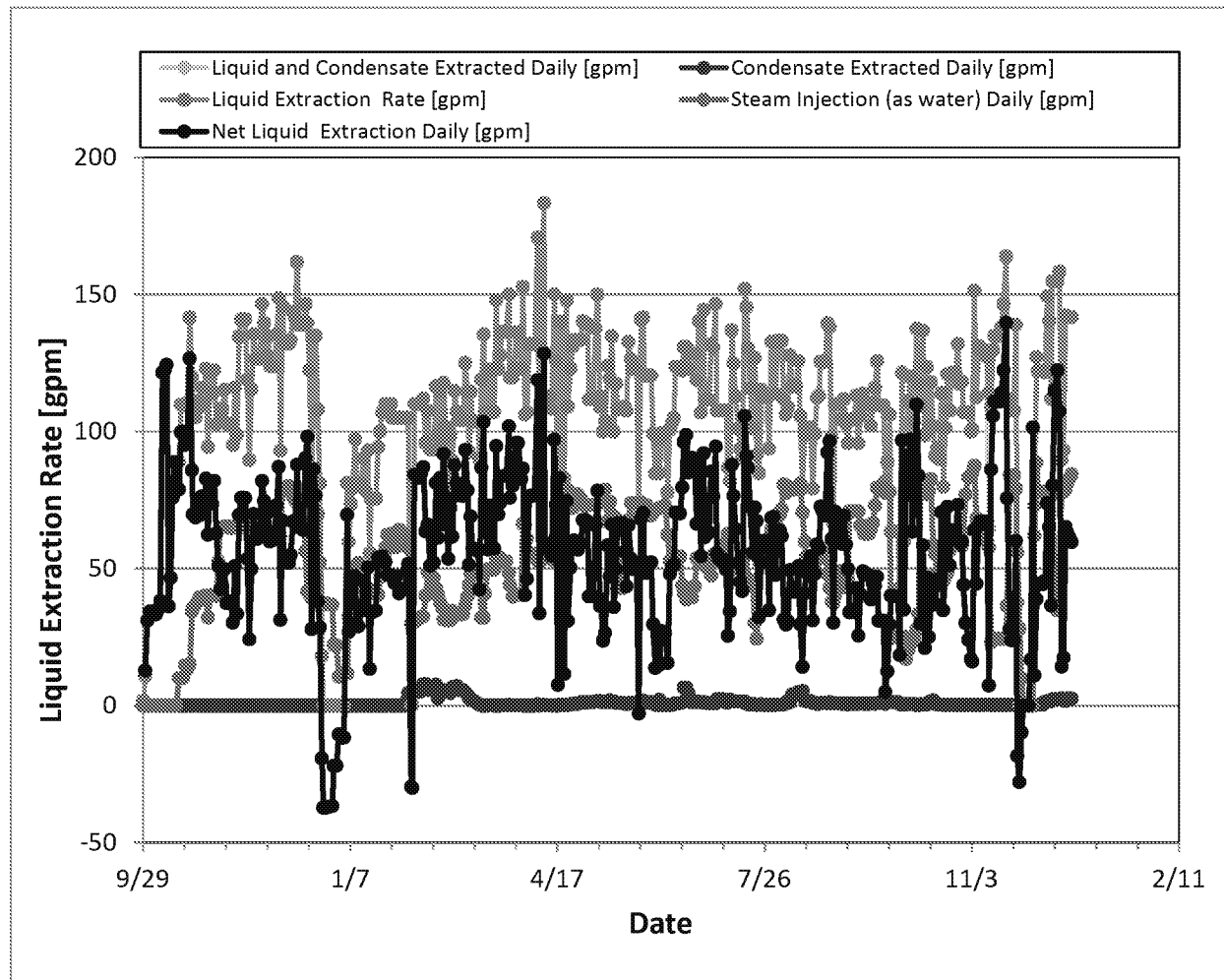


Figure 19. Water Balance Rates

15. Cumulative Energy Balance

The cumulative energy balance for the site is shown below. The energy balance has been updated to include calculated heat losses that are a combination of heat lost below the TTZ, above the TTZ and outside the TTZ. The heat losses were calculated according to the following approach:

- Based on the original SEE model, cumulative modeled heat losses were calculated for each operational phase (i.e., heat up, pressure cycling);
- The heat losses were compared to the cumulative energy added as steam for each operational phase;
- The percent of total steam energy “lost” was calculated by comparing modeled heat losses to modeled steam injection;
- Since the actual steam injection rates at ST012 have been different than originally modeled, the percent heat loss calculated for each operational phase in the model was applied to the actual steam injected to get the calculated heat losses during operation; and,
- The calculated heat losses were subtracted from the net energy injection to calculate the net energy injected with heat losses.

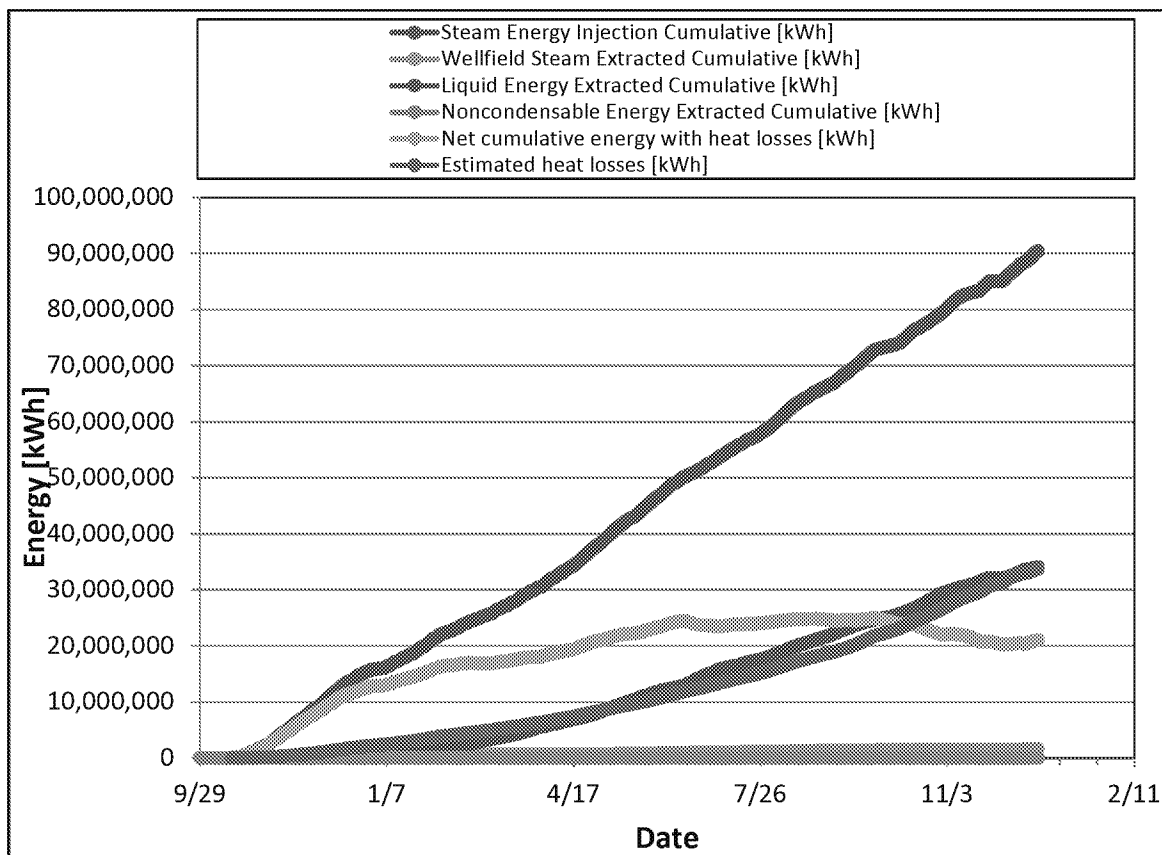


Figure 20. Cumulative Energy Balance

16. Energy Balance Rates

The energy balance rates are shown below.

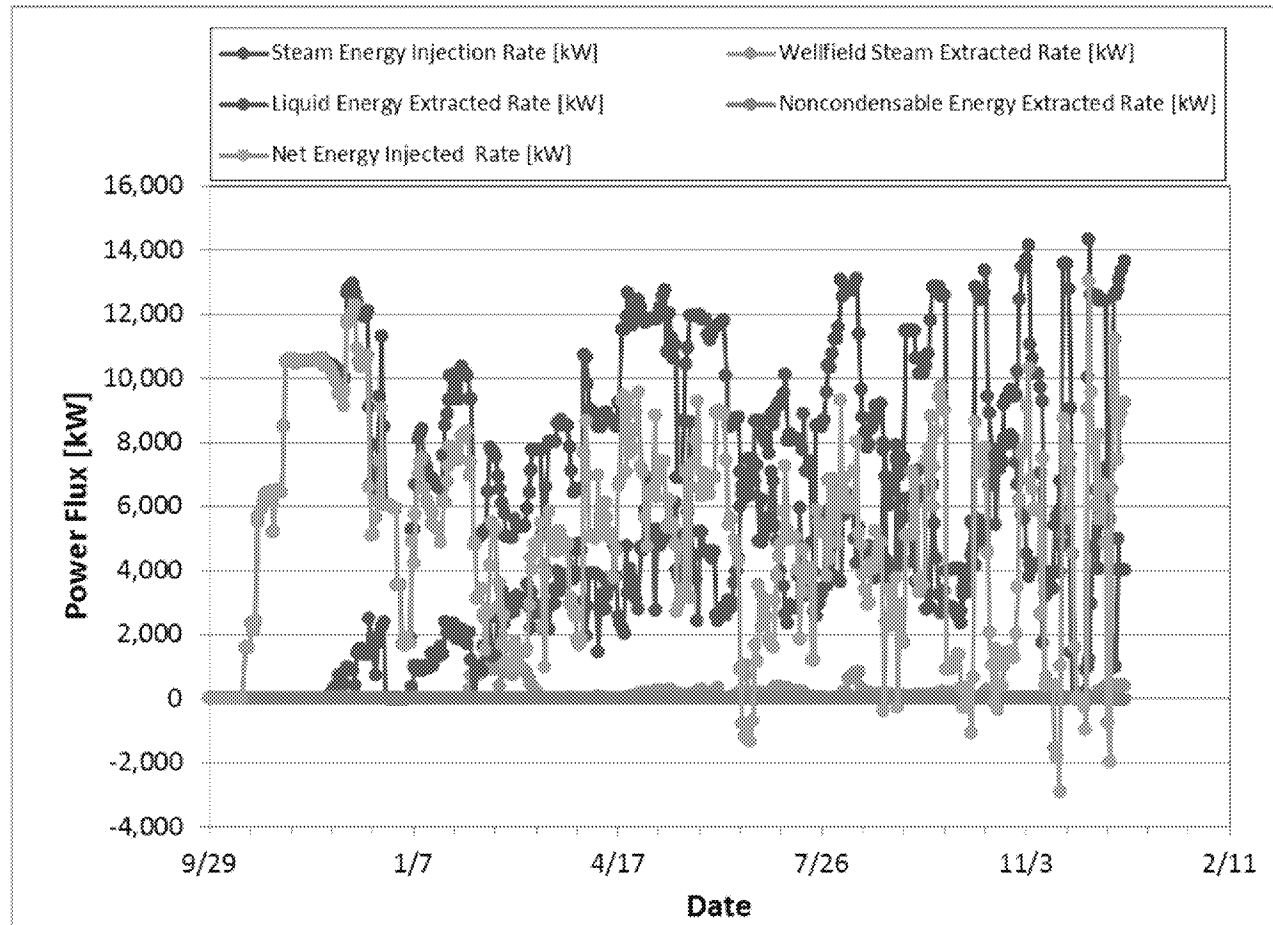


Figure 21. Energy Balance Rates

17. Perimeter Water Level Data

Table 4 below presents the change in perimeter groundwater elevations since SEE system startup. The readings collected on September 24, 2014 (not shown) represent baseline conditions. A negative number shows that the groundwater elevation is lower than the baseline elevation, thus indicating an inward hydraulic gradient into the treatment zone. Liquid extraction began on September 29, 2014. Perimeter water level data are collected on a weekly basis. The regional groundwater table at the Site is increasing at a rate of approximately 1.5 ft/year; thus, each measured value shown in Table 4 has been corrected to take the regional changes into account.

Table 4. Perimeter Groundwater Elevation Changes

| Monitoring Well | 11/27/2015 | | 12/4/2015 | | 12/11/2015 | | 12/18/2015 | |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | Change from Baseline | Change from Previous | Change from Baseline | Change from Previous | Change from Baseline | Change from Previous | Change from Baseline | Change from Previous |
| CZ/UWBZ Wells | | | | | | | | |
| ST012-C01 | -1.08 | 0.01 | -1.22 | -0.11 | -0.90 | 0.35 | -1.18 | -0.25 |
| ST012-C02 | -0.60 | 0.44 | -1.03 | -0.40 | -0.46 | 0.60 | -0.79 | -0.30 |
| UWBZ Wells | | | | | | | | |
| ST012-RB-3A | -1.15 | -0.24 | -2.59 | -1.41 | -0.37 | 2.25 | -1.60 | -1.20 |
| ST012-U02 | -0.82 | -0.08 | -1.71 | -0.86 | -0.42 | 1.32 | -1.25 | -0.80 |
| ST012-U11 | -1.28 | 0.15 | -2.37 | -1.06 | -0.42 | 1.98 | -1.41 | -0.96 |
| ST012-U12 | -2.12 | -0.34 | -3.75 | -1.60 | -0.36 | 3.42 | -2.21 | -1.82 |
| ST012-U37 | -1.37 | -0.46 | -2.59 | -1.19 | -0.15 | 2.47 | -2.00 | -1.82 |
| ST012-U38 | -0.80 | 0.02 | -1.48 | -0.65 | -0.43 | 1.08 | -1.00 | -0.54 |
| LSZ Wells | | | | | | | | |
| ST012-W11 | -4.03 | 2.94 | -3.41 | 0.64 | 0.01 | 3.45 | -1.52 | -1.50 |
| ST012-W12 | -3.25 | 3.08 | -3.12 | 0.16 | 0.67 | 3.82 | -1.16 | -1.80 |
| ST012-W24 | -5.59 | -1.24 | -2.91 | 2.71 | -2.29 | 0.65 | 0.66 | 2.98 |
| ST012-W30 | -2.97 | 3.20 | -3.35 | -0.36 | 1.02 | 4.41 | -1.17 | -2.17 |
| ST012-W34 | -2.46 | 2.65 | -2.17 | 0.32 | 0.78 | 2.98 | -0.58 | -1.33 |
| ST012-W36 | -5.56 | -1.72 | -2.16 | 3.43 | -1.88 | 0.31 | 3.16 | 5.07 |
| ST012-W37 | 0.80 | 6.38 | -4.11 | -4.89 | -3.13 | 1.01 | 0.84 | 4.00 |
| ST012-W38 | -2.07 | 2.47 | -2.14 | -0.04 | 0.70 | 2.87 | -0.63 | -1.30 |

December 23, 2015

Figure 22 shows the manually collected groundwater elevation trends since system startup. Additionally Figure 23 shows the groundwater elevations continuously logged in selected perimeter wells equipped with transducers. The regional groundwater table correction has also been applied to Figure 22 below.

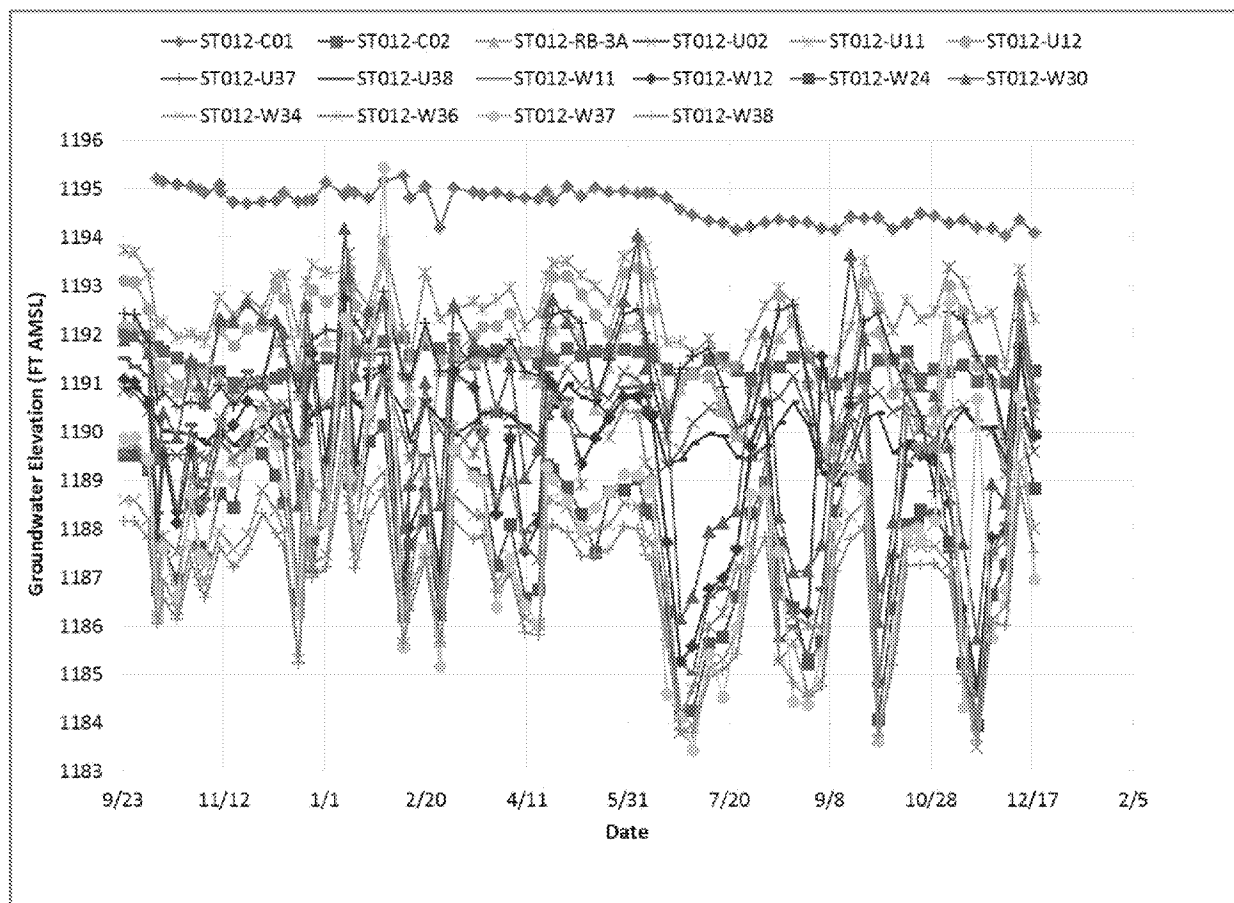


Figure 22. Manually Collected Perimeter Groundwater Elevations

Progress Report

Steam Enhanced Extraction Remediation at the Former Williams AFB ST012 Site, Mesa, AZ

December 23, 2015

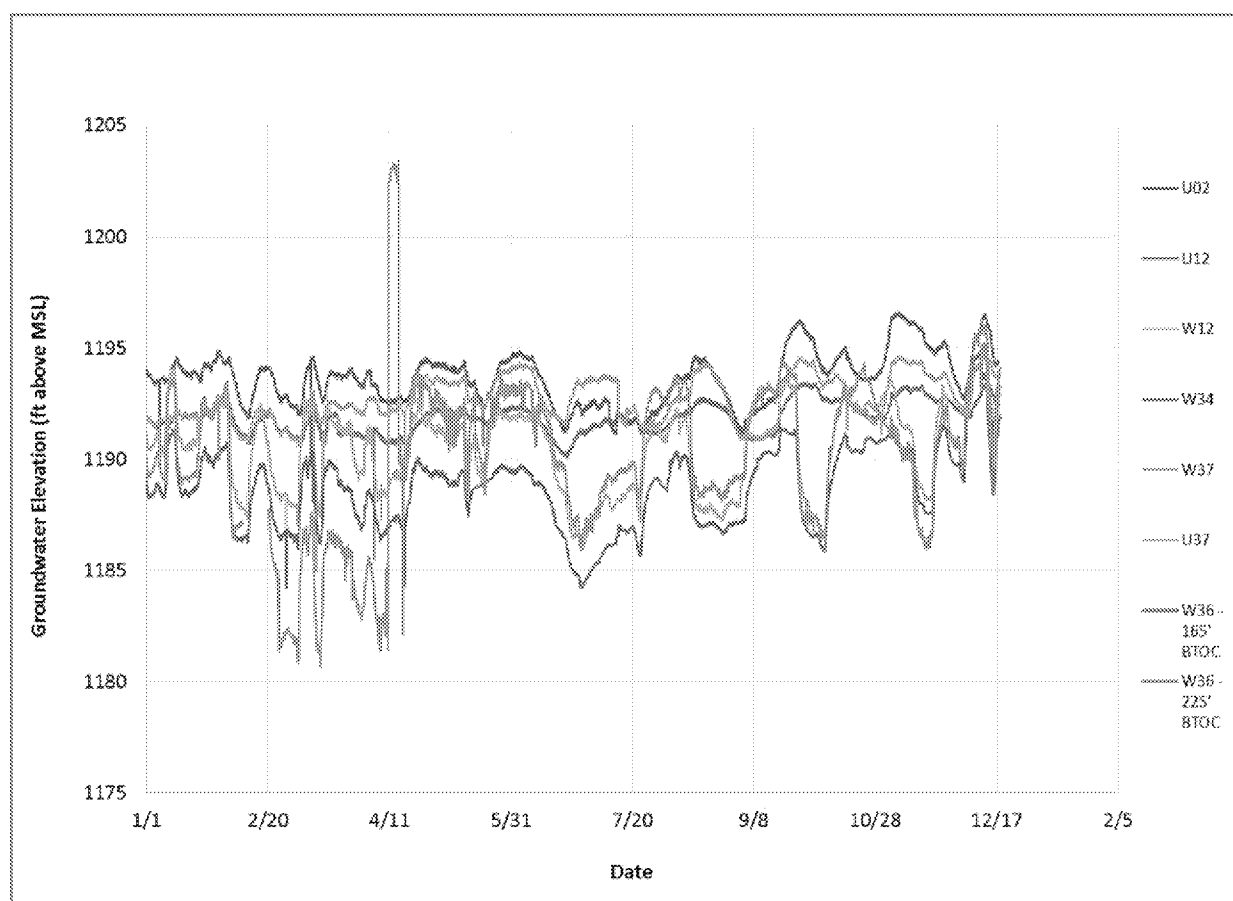


Figure 23. Automatically Collected Perimeter Groundwater Elevations

Table 5 below presents the measured LNAPL thicknesses of the perimeter wells at the site. Perimeter LNAPL thickness data are collected on a weekly basis.

Table 5. Perimeter LNAPL Thicknesses (ft)

| Monitoring Well | 11/27/2015 | | 12/4/2015 | | 12/11/2015 | | 12/18/2015 | |
|----------------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|---------------|
| | Before bailing | After Bailing | Before bailing | After Bailing | Before bailing | After Bailing | Before bailing | After Bailing |
| CZ/UWBZ Wells | | | | | | | | |
| ST012-C01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ST012-C02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| UWBZ Wells | | | | | | | | |
| ST012-U02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ST012-U11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ST012-U12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ST012-U37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ST012-U38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ST012-RB-3A | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| LSZ Wells | | | | | | | | |
| ST012-W11 | 2.77 | 2.77 | 4.50 | 4.50 | 1.74 | 1.74 | 5.47 | 5.47 |
| ST012-W12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ST012-W24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ST012-W30 | 0.03 | 0.03 | 0.02 | 0.02 | 0.03 | 0.03 | 0.01 | 0.01 |
| ST012-W34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ST012-W36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ST012-W37 | 13.59 | 13.59 | 19.90 | 19.90 | 0.00 | 0.00 | 84.57 | 9.27 |
| ST012-W38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

December 23, 2015

On December 1, 2014, temperatures at selected perimeter wells were added to the monitoring program. Figure 24 below shows the manually collected temperatures recorded at the wells included in the monitoring program. Additionally Figure 25 shows the temperatures continuously logged in selected perimeter wells equipped with transducers.

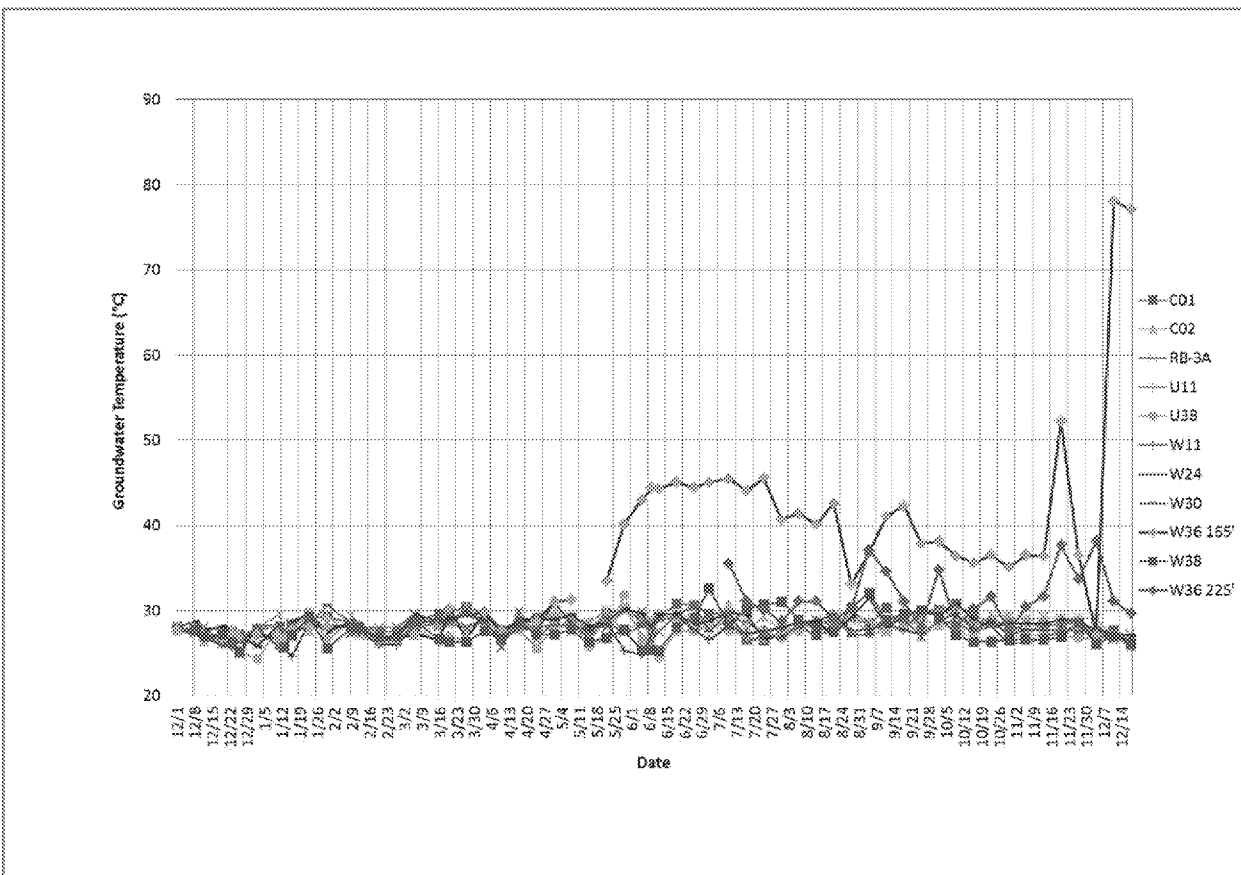


Figure 24. Manually Collected Perimeter Well Groundwater Temperatures

Note: Thermocouples are measured at approximate depths as follows (in feet below top of casing): C01=162; C02=168; RB-3A=161; U11=180; U38=164; W11=228; W24=230; W30=231; W36=225; and W38=228.

As a response to the increased temperatures observed at W36 on December 12, 2015 steam at nearby UWBZ9 and UWBZ25 were decreased.

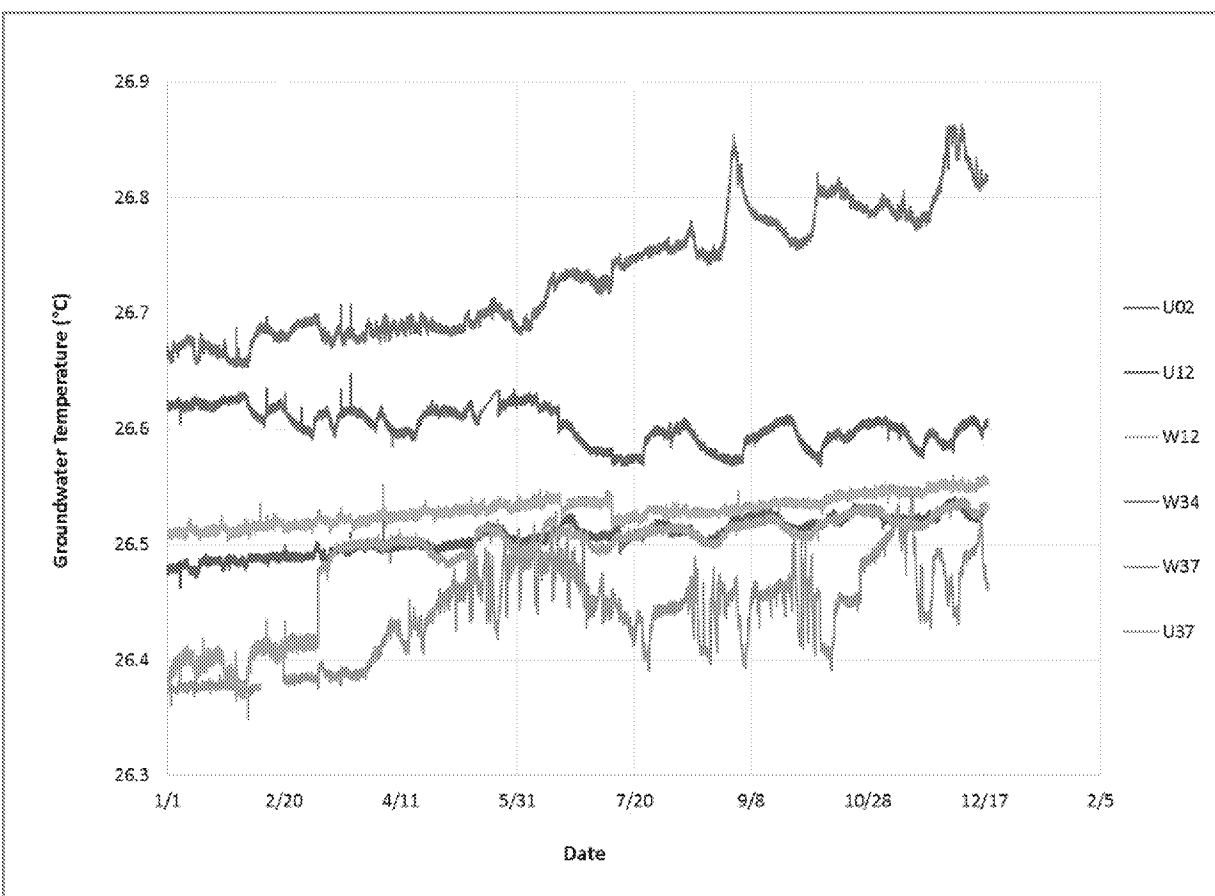


Figure 25. Automatically Collected Perimeter Well Groundwater Temperatures

Notes:

On March 7, 2015 operational personnel replaced the U37 logger unit. The increase in temperature on March 7, 2015 at U37 is a result of this replacement.

Transducers are measured at depths as follows (in feet below top of casing): U02= 175; U12= 175; U37= 182; W12= 228; W34= 225; and W37= 226.

18. Natural Gas Usage

The following figure shows the natural gas usage rate in cubic feet per hour (cf/hr) and cumulative natural gas use in cubic feet (cf) to date at the site.

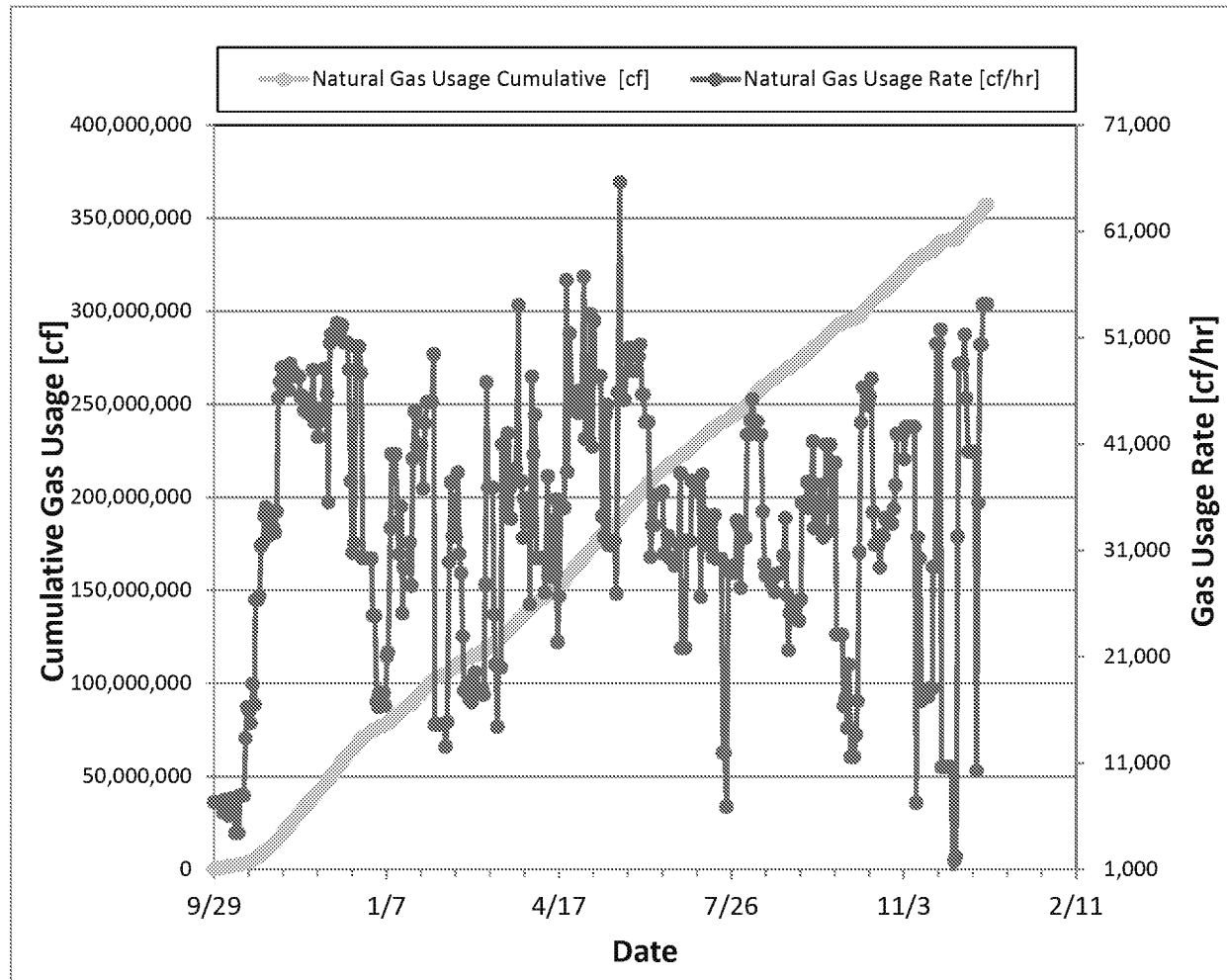


Figure 26. Natural Gas Usage

19. Waste Generation

On January 19, 2015 a total of 8,033 gallons of material from tank cleanout activities was removed from the site by Mesa Oil for recycling. The mass of JP-4 in the material was estimated to be 2,857 gallons or 18,800 lbs.

On February 18 and 19, 2015 a total of 24,430 gallons of material from tank cleanout activities was removed from the site by Mesa Oil for recycling. The mass of JP-4 in the material was estimated to be 3,645 gallons or 23,984 lbs.

On March 12, 2015 a total of 11,359 gallons of predominantly water from tank cleanout activities was removed from the site by Mesa Oil for recycling. The JP-4 mass in the water was limited.

On March 20, 2015 the first shipment of bag filters (four cubic yard boxes) from the SEE process treatment system was shipped offsite for non-hazardous disposal.

On March 30 and 31, 2015 a total of 32,000 lbs of spent liquid carbon was removed from the site by Evoqua Water Technologies for regeneration at their Red Bluff, CA facility.

On April 24, 2015 a shipment of bag filters (three cubic yard boxes) from the SEE process treatment system was shipped offsite for non-hazardous disposal.

On May 29, 2015 a shipment of bag filters (four cubic yard boxes) from the SEE process treatment system was shipped offsite for non-hazardous disposal.

On June 11, 2015 three 55-gallon drums of soil dug from around the Hypro NAPL filter were shipped offsite for non-hazardous disposal.

On June 10, 2015 a total of 5,727 gallons of oily bio-impacted water from tank cleanout activities was removed from the site by Mesa Oil for recycling.

On June 25, 2015 a shipment of bag filters (four cubic yard boxes) from the SEE process treatment system was shipped offsite for non-hazardous disposal.

On August 19, 2015 a total of 16,000 lbs of spent liquid carbon was removed from the site by Evoqua Water Technologies for regeneration at their Red Bluff, CA facility.

On August 27, 2015 a total of five totes with approximately 250 gallons each of water/solids from disinfection of the liquid carbon vessel were removed from the site by MP Environmental for disposal.

On October 22, 2015 a shipment of bag filters (four cubic yard boxes) from the SEE process treatment system was shipped offsite for non-hazardous disposal.

On November 23, 2015 a shipment of bag filters (four cubic yard boxes) from the SEE process treatment system was shipped offsite for non-hazardous disposal.

20. NAPL Reuse

On April 7, 2015 a total of 12,647 gallons of stored NAPL was sent to Mesa Oil for reuse. The analysis showed that 703 gallons of the total fluid was water. The water has been subtracted from the NAPL recovery estimate.

On April 21-22, 2015 a total of 13,076 gallons of stored NAPL was sent to Mesa Oil for reuse. Analysis showed a water content between <1% to 3% or a total of 227 gallons of water. The water removed has been subtracted from the NAPL recovery estimate.

On May 7, 2015 a total of 5,722 gallons of stored NAPL was sent to Mesa Oil for reuse.

On May 21, 2015 a total of 1,400 gallons of stored NAPL was sent to Mesa Oil for reuse.

On June 24, 2015 a total of 6,771 gallons of stored NAPL was sent to Mesa Oil for reuse.

21. Estimated Formation Water Temperature

The estimated formation water temperatures are indicated in Table 6 below. The formation water temperatures have been estimated for each MPE well by measuring the eductor liquid feed and return flow rate together with the eductor liquid feed and return temperatures. The enthalpy increase in the liquid return temperature as compared to the liquid feed stream temperature is used to provide the MPE well specific formation temperature. Estimated formation water temperatures above the boiling point likely indicate that steam is being pulled into the liquid extraction system. These estimated data for each MPE well location are used in conjunction with the extracted vapor data collected at the MPE wells to make determinations on steam breakthrough around the site. All of these data are reviewed holistically (with other site data such as the TMP data) to determine when and where steam cycling events should commence.

The location of each MPE well is also indicated in the table. Since perimeter extraction wells are expected to extract colder water from outside of the treatment zone, the formation temperature at these locations is not expected to reach steam temperatures. Thus, full or partial steam breakthrough can still be occurring at the perimeter locations without the estimated formation water temperature being at boiling. Please note that if the estimated formation water temperature is higher than 220°C for a given well, ">220" is indicated in the table.

Please note that no vapor temperature data were collected from the MPE wellheads November 5-13, 2015 due to issues with the temperature equipment.

Table 6. Estimated Well Formation Temperatures

| Formation Temperatures | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------|------------|-------------------|--------------------------|----------------------|---------|---------|---------|----------|----------|----------|----------|----------|----------|---------|---------|----------|----------|---------|---------|---------|----------|----------|----------|
| Well | Well | Required to Reach | Reached Steam | Vapor Extraction | 10/1/15 | 10/6/15 | 10/8/15 | 10/13/15 | 10/15/15 | 10/20/15 | 10/22/15 | 10/27/15 | 10/29/15 | 11/3/15 | 11/5/15 | 11/17/15 | 11/23/15 | 12/1/15 | 12/3/15 | 12/8/15 | 12/10/15 | 12/15/15 | 12/18/15 |
| | Location | Steam Temperature | Temperature (Calculated) | Max Temperature [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] |
| CZ07 | Perimeter | No | No | 158 | 155 | 126 | 191 | | 166 | 191 | 210 | >220 | 211 | 215 | 138 | 205 | 93 | | 209 | | 114 | | 219 |
| CZ08 | Perimeter | No | No | 138 | 147 | 153 | 156 | | 173 | | 175 | 174 | 183 | 186 | 136 | 202 | 194 | 207 | 165 | 183 | 195 | | 215 |
| CZ09 | Perimeter | No | No | 105 | 159 | 120 | 124 | 138 | 144 | 109 | 120 | 111 | 112 | 131 | 100 | | 139 | 141 | 156 | 122 | 124 | | 163 |
| CZ10 | Perimeter | No | Yes | 206 | 151 | 114 | >220 | | | 65 | 120 | 123 | | 88 | 111 | 181 | 197 | 176 | 188 | >220 | 192 | | 199 |
| CZ11 | Interior | Yes | Yes | 212 | | | | 212 | >220 | >220 | >220 | >220 | >220 | >220 | 159 | >220 | >220 | 85 | | | | | 90 |
| CZ12 | Perimeter | No | Yes | 195 | 144 | 130 | | 121 | | | 162 | 162 | 173 | 181 | 143 | | 201 | 200 | 199 | 179 | 176 | | |
| CZ13 | Perimeter | No | Yes | 160 | 122 | 145 | 135 | | | 166 | 168 | 169 | 175 | 177 | 178 | 211 | 178 | 100 | 113 | 212 | 216 | | 218 |
| CZ14 | Perimeter | No | Yes | 112 | >220 | >220 | 212 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | 197 | | >220 | >220 | 189 | 171 | >220 | | 204 |
| CZ15 | Interior | Yes | Yes | 120 | 122 | 121 | 157 | 113 | 105 | 200 | 207 | >220 | 182 | >220 | 168 | 201 | 210 | 218 | 213 | >220 | 217 | | >220 |
| CZ16 | Perimeter | No | Yes | 210 | 158 | 132 | 176 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | 203 | | >220 | | | | | | |
| CZ17 | Perimeter | No | Yes | 200 | 148 | 134 | 144 | 167 | 186 | 210 | 210 | 164 | 189 | >220 | >220 | 176 | >220 | 197 | 157 | >220 | 175 | | 220 |
| CZ18 | Perimeter | No | No | 100 | 126 | 105 | 122 | 134 | 103 | 160 | 133 | 150 | 158 | 174 | 160 | 174 | 105 | 139 | | 190 | 125 | | 178 |
| CZ19 | Perimeter | No | No | 110 | 135 | 135 | 141 | 152 | 107 | 181 | 171 | 169 | 205 | 178 | 182 | 181 | 206 | 180 | 175 | 212 | >220 | | >220 |
| CZ20 | Outside CZ | No | No | 111 | 97 | 91 | 100 | 96 | 98 | 96 | 95 | 93 | 90 | 81 | 91 | 87 | 88 | | 96 | 95 | 92 | | 132 |
| LSZ01 | Interior | Yes | Yes | 126 | 193 | 186 | 201 | 189 | 182 | 193 | 196 | >220 | 199 | 204 | 131 | | 219 | >220 | 205 | >220 | 214 | >220 | >220 |
| LSZ02 | Interior | Yes | Yes | 130 | 191 | 29 | | 213 | >220 | 89 | | | | >220 | 176 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 |
| LZS04 | Interior | Yes | Yes | 206 | 93 | | | | | | | | | | | | | | | | | | |
| LSZ05 | Interior | Yes | Yes | 220 | | | | | | | | | | | | | | | | | | 213 | |
| LSZ06 | Interior | Yes | Yes | 218 | >220 | >220 | >220 | >220 | >220 | 204 | >220 | >220 | >220 | >220 | 196 | | >220 | 92 | | | | | |
| LSZ08 | Perimeter | No | Yes | 120 | 212 | >220 | 208 | | 179 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | |
| LSZ11 | Perimeter | No | Yes | 119 | | | 144 | 121 | 137 | 129 | 119 | 123 | 121 | 124 | | 164 | 215 | 117 | 118 | 125 | 179 | 121 | |
| LSZ12 | Perimeter | No | No | 126 | 170 | 168 | 170 | 175 | 190 | 186 | 186 | 187 | 188 | 188 | 130 | 193 | 189 | 167 | 193 | 196 | 194 | 218 | 212 |
| LSZ13 | Interior | Yes | Yes | 125 | 218 | 196 | 206 | 218 | >220 | 209 | 216 | 210 | 215 | 186 | 122 | 195 | >220 | >220 | 217 | >220 | 206 | 209 | 220 |
| LSZ14 | Perimeter | No | No | 125 | 169 | 164 | 162 | 172 | 183 | 191 | 183 | 194 | 202 | 218 | 135 | 202 | 198 | 85 | | | 174 | >220 | >220 |
| LSZ15 | Interior | Yes | Yes | 208 | 212 | 205 | 196 | 220 | >220 | 219 | >220 | | | | | | >220 | >220 | >220 | | >220 | >220 | 205 |
| LSZ16 | Interior | Yes | Yes | 205 | 160 | 152 | 160 | 170 | 208 | 193 | 181 | 187 | 190 | 183 | 126 | 186 | 182 | 172 | 207 | >220 | >220 | | >220 |
| LSZ17 | Perimeter | No | Yes | 220 | 119 | 109 | 109 | | | 129 | 127 | 119 | 116 | 115 | 112 | 115 | 110 | 103 | 100 | 113 | 115 | 115 | 117 |
| LSZ28 | Perimeter | No | Yes | 129 | 167 | 150 | 156 | | 174 | 185 | 184 | 187 | 190 | 194 | 100 | | 173 | 170 | 166 | 184 | >220 | >220 | >220 |
| LSZ29 | Perimeter | No | No | 116 | 184 | 176 | 189 | 198 | 185 | 171 | 186 | 191 | 206 | >220 | 141 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | |
| LSZ30 | Interior | Yes | Yes | 133 | >220 | 198 | 203 | 218 | >220 | >220 | >220 | 131 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 |
| LSZ31 | Interior | Yes | Yes | 147 | 175 | 184 | >220 | >220 | >220 | >220 | >220 | | 189 | >220 | 150 | | >220 | 187 | >220 | >220 | 162 | | >220 |
| LSZ32 | Interior | Yes | Yes | 120 | 202 | 178 | 192 | 211 | 213 | 214 | >220 | 217 | >220 | >220 | 150 | >220 | >220 | >220 | >220 | 185 | >220 | 186 | >220 |
| LSZ33 | Perimeter | No | Yes | 130 | 192 | 188 | 183 | 186 | 192 | 195 | 193 | 197 | 201 | 208 | 144 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 |
| LSZ34 | Interior | Yes | Yes | 168 | 171 | 203 | 187 | 142 | 132 | 146 | 197 | 202 | 215 | 206 | 142 | >220 | >220 | | >220 | >220 | >220 | >220 | >220 |
| LSZ35 | Perimeter | No | Yes | 121 | 127 | 124 | 124 | 125 | 124 | 120 | 127 | 131 | 126 | 136 | 126 | 126 | 134 | 118 | 194 | 135 | 134 | 127 | 124 |
| LSZ36 | Perimeter | No | Yes | 128 | 192 | 171 | 171 | 181 | 189 | >220 | 177 | 152 | | >220 | 189 | >220 | >220 | | 152 | 92 | 104 | 191 | 188 |
| LSZ37 | Perimeter | No | Yes | 208 | 176 | 116 | 113 | 208 | >220 | 220 | 212 | 127 | 215 | >220 | >220 | 140 | 200 | | | | 132 | >220 | |
| LSZ38 | Perimeter | No | Yes | 116 | 161 | 141 | 176 | 166 | 128 | 178 | 195 | 113 | >220 | 98 | | 147 | 151 | >220 | | 179 | >220 | 112 | |
| LSZ39 | Perimeter | No | No | 118 | 135 | 109 | 113 | 119 | 144 | 130 | 131 | 105 | 132 | 148 | 143 | 135 | | | 109 | 122 | 130 | 129 | |
| LSZ40 | Interior | Yes | Yes | 135 | >220 | 210 | 193 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | 205 | | >220 |
| LSZ42 | Perimeter | No | Yes | 130 | 180 | 184 | 189 | 187 | 190 | 193 | 195 | 200 | 202 | 201 | 139 | >220 | >220 | 214 | 205 | 213 | 215 | >220 | |

| Formation Temperatures | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------|------------------------|-------------------|--------------------------|----------------------|---------|---------|---------|----------|----------|----------|----------|----------|----------|---------|---------|----------|----------|---------|---------|---------|----------|----------|----------|
| Well | Well | Required to Reach | Reached Steam | Vapor Extraction | 10/1/15 | 10/6/15 | 10/8/15 | 10/13/15 | 10/15/15 | 10/20/15 | 10/22/15 | 10/27/15 | 10/29/15 | 11/3/15 | 11/5/15 | 11/17/15 | 11/23/15 | 12/1/15 | 12/3/15 | 12/8/15 | 12/10/15 | 12/15/15 | 12/18/15 |
| | Location | Steam Temperature | Temperature (Calculated) | Max Temperature [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] | [°F] |
| UWBZ01 | Interior | Yes | Yes | 150 | >220 | >220 | >220 | 140 | >220 | 177 | 172 | >220 | 205 | 201 | 143 | | >220 | 184 | >220 | >220 | >220 | | >220 |
| UWBZ02 | Interior | Yes | Yes | 210 | 190 | >220 | >220 | >220 | >220 | >220 | >220 | >220 | 197 | 84 | | | | | | | | | |
| UWBZ04 | Interior | Yes | Yes | 188 | | | | | | | 205 | 217 | 39 | >220 | 182 | >220 | >220 | >220 | 154 | >220 | >220 | | >220 |
| UWBZ05 | Interior | Yes | Yes | 220 | >220 | >220 | >220 | >220 | >220 | >220 | 214 | 200 | 196 | >220 | 165 | >220 | >220 | | | | | | 178 |
| UWBZ06 | Interior | Yes | Yes | 165 | 185 | 189 | 203 | 94 | 96 | 97 | 95 | 93 | 207 | >220 | 135 | 0 | 170 | >220 | 128 | 134 | 146 | | 128 |
| UWBZ10 | Perimeter | No | Yes | 179 | 209 | 217 | >220 | | >220 | 188 | 180 | 187 | 182 | 199 | 144 | >220 | >220 | >220 | 199 | >220 | >220 | | >220 |
| UWBZ17 | Perimeter | No | Yes | 220 | >220 | 148 | >220 | | >220 | 185 | 188 | 170 | 183 | 206 | 140 | >220 | >220 | 213 | 209 | >220 | >220 | | >220 |
| UWBZ18 | Interior | Yes | Yes | 180 | 180 | >220 | >220 | >220 | 162 | >220 | >220 | >220 | 150 | >220 | 102 | 195 | >220 | >220 | >220 | 89 | | | >220 |
| UWBZ19 | Perimeter | No | Yes | 162 | 198 | 133 | >220 | >220 | >220 | 209 | 198 | 94 | 182 | 187 | 132 | | >220 | 159 | >220 | >220 | >220 | | >220 |
| UWBZ20 | Dual Phase - Perimeter | No | No | 112 | | | | | 108 | | | | | | | | 187 | | | | | | |
| UWBZ21 | Outside UWBZ | No | No | 118 | 165 | 162 | 156 | 166 | 148 | 165 | 175 | 173 | 173 | 166 | 112 | 217 | >220 | >220 | >220 | 179 | >220 | | 194 |
| UWBZ22 | Perimeter | No | No | 127 | 143 | 155 | 170 | 158 | 164 | 82 | 131 | 133 | 134 | 118 | 127 | 207 | >220 | 162 | 170 | 187 | 202 | | 187 |
| UWBZ23 | Outside UWBZ | No | Yes | 131 | 171 | 214 | 215 | >220 | >220 | >220 | 218 | 208 | 213 | 212 | 146 | >220 | >220 | 178 | >220 | >220 | >220 | | 211 |
| UWBZ24 | Dual Phase - Perimeter | No | No | 190 | 111 | 140 | 139 | 155 | | 106 | 95 | 94 | | 95 | 30 | >220 | | 212 | >220 | >220 | >220 | | >220 |
| UWBZ26 | Outside UWBZ | No | No | 105 | 123 | 116 | 131 | 123 | 134 | 116 | 133 | 100 | 116 | 130 | 112 | 131 | 130 | | 130 | >220 | 127 | | 91 |
| UWBZ27 | Outside UWBZ | No | Yes | 115 | 165 | 210 | 191 | >220 | >220 | >220 | >220 | 105 | >220 | >220 | 216 | 215 | | | 115 | | 110 | | 126 |

| | |
|-------|---|
| RED | : at or above steam temperature (≥210 °F) |
| GREEN | : below steam temperature (<210 °F) |

Note: CZ and UWBZ MPE wells were turned off on 12/15/15 for the LSZ groundwater sampling event.

22. NAPL Screening Results and Calculated Benzene Concentrations

Figures 27-29 below present the screening level results for NAPL detected in samples collected from MPE wells across the site. Screening samples are typically collected on a weekly basis. The figures below also include calculated benzene concentrations of groundwater samples collected from MPE wells across the site.

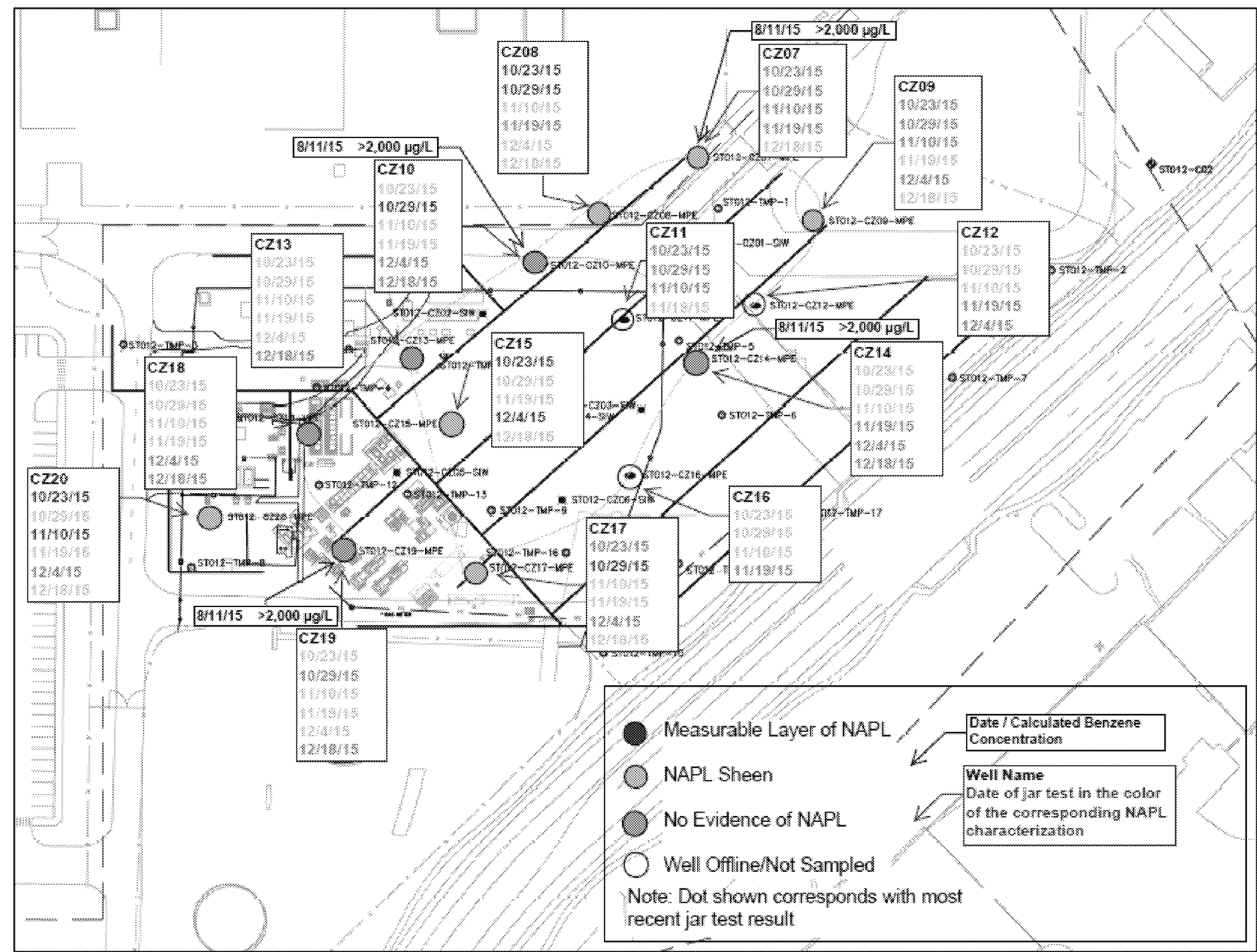


Figure 27. NAPL Screening Results and Calculated Benzene Concentrations – Cobble Zone

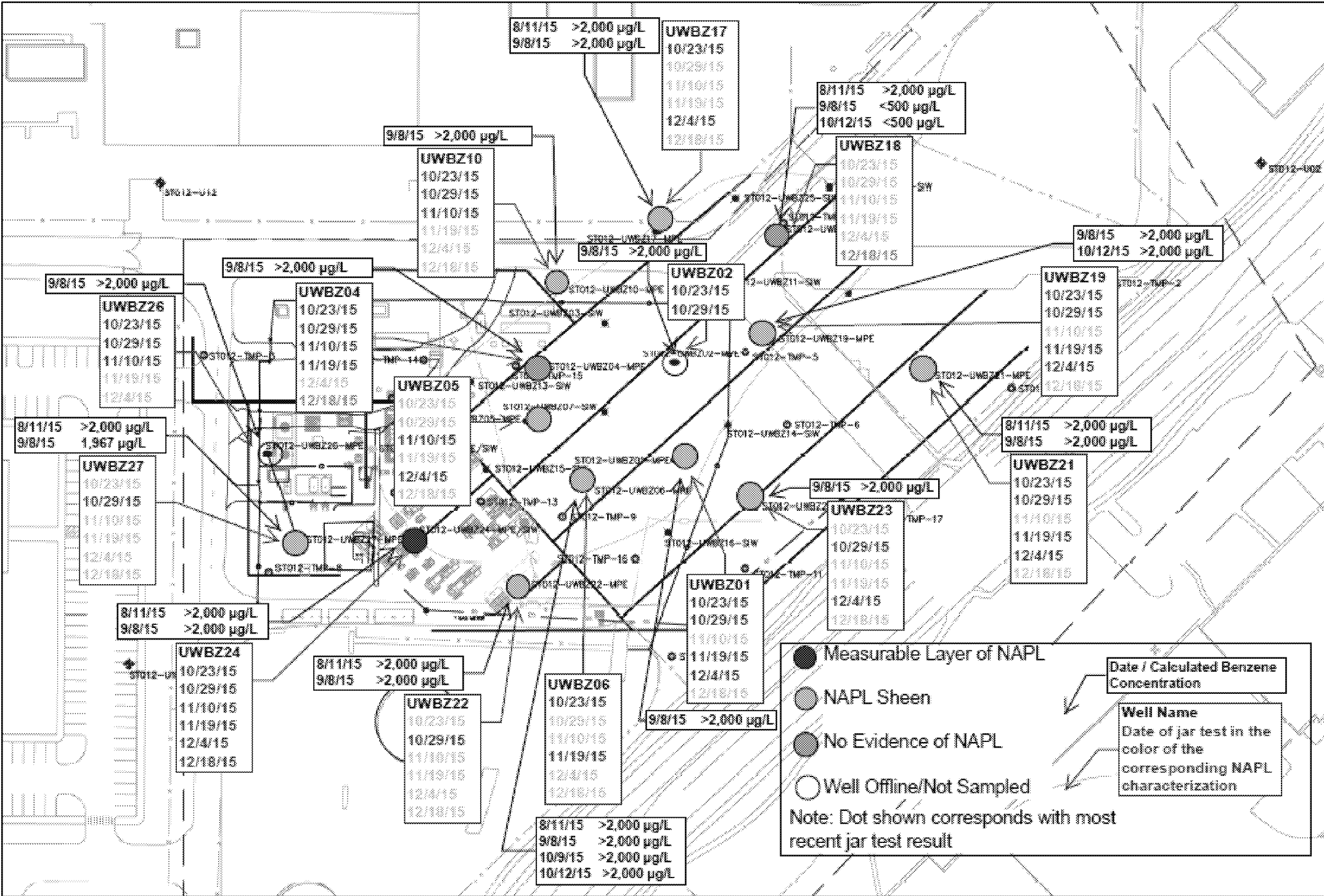


Figure 28. NAPL Screening Results and Calculated Benzene Concentrations – Upper Water Bearing Zone

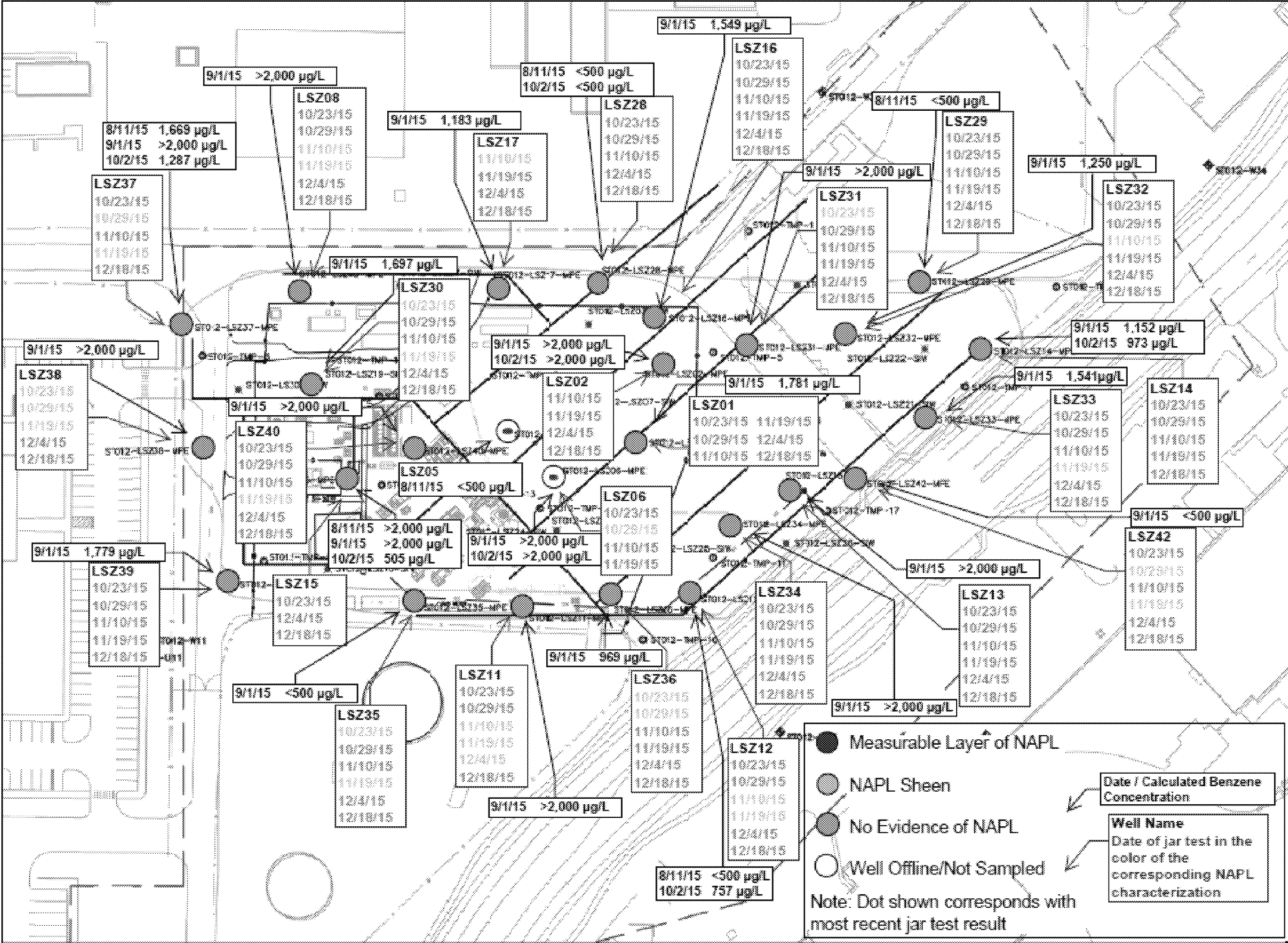


Figure 29. NAPL Screening Results and Calculated Benzene Concentrations – Lower Saturated Zone